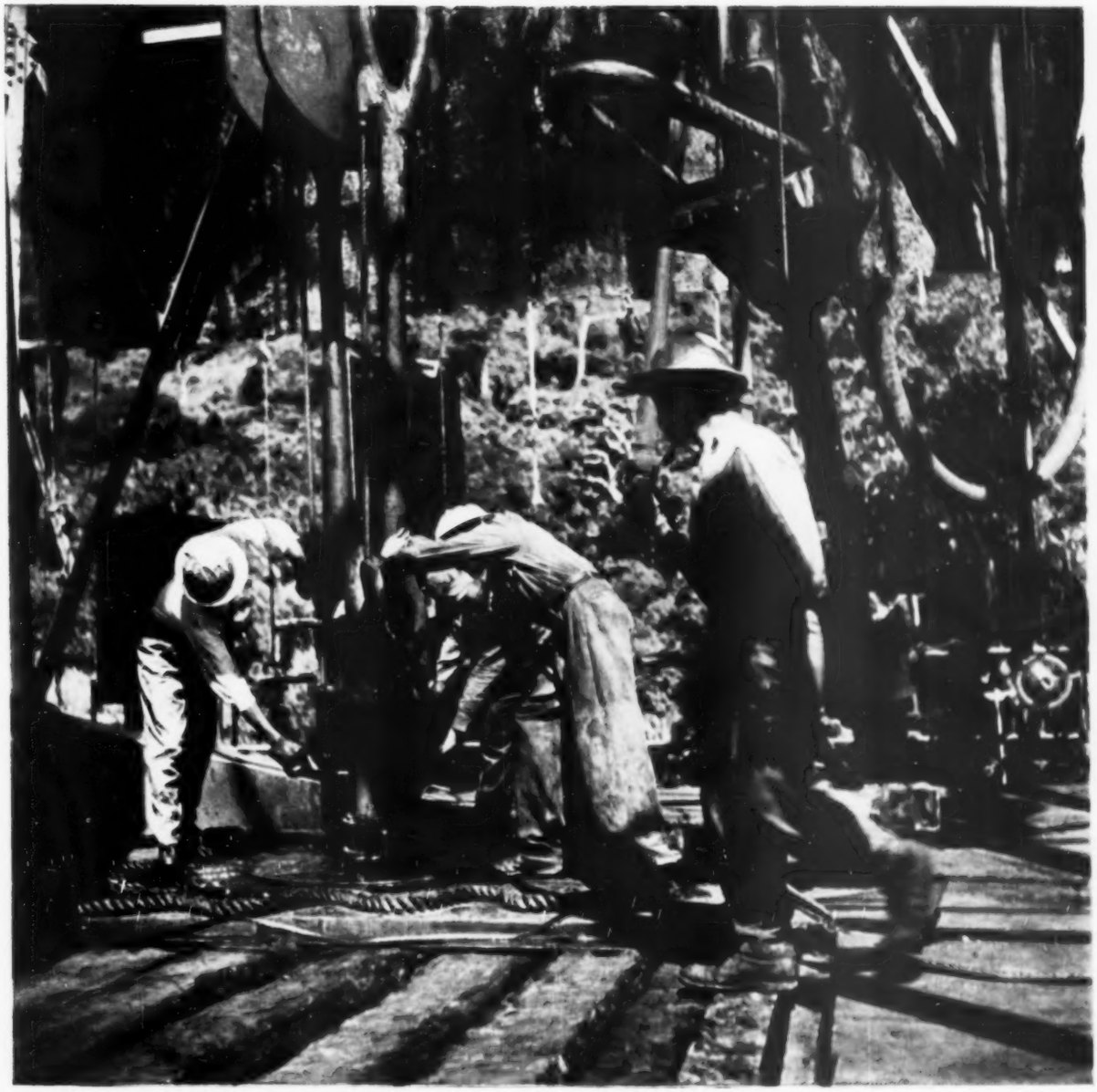
WORLD PETROLEUM

DECEMBER 1959



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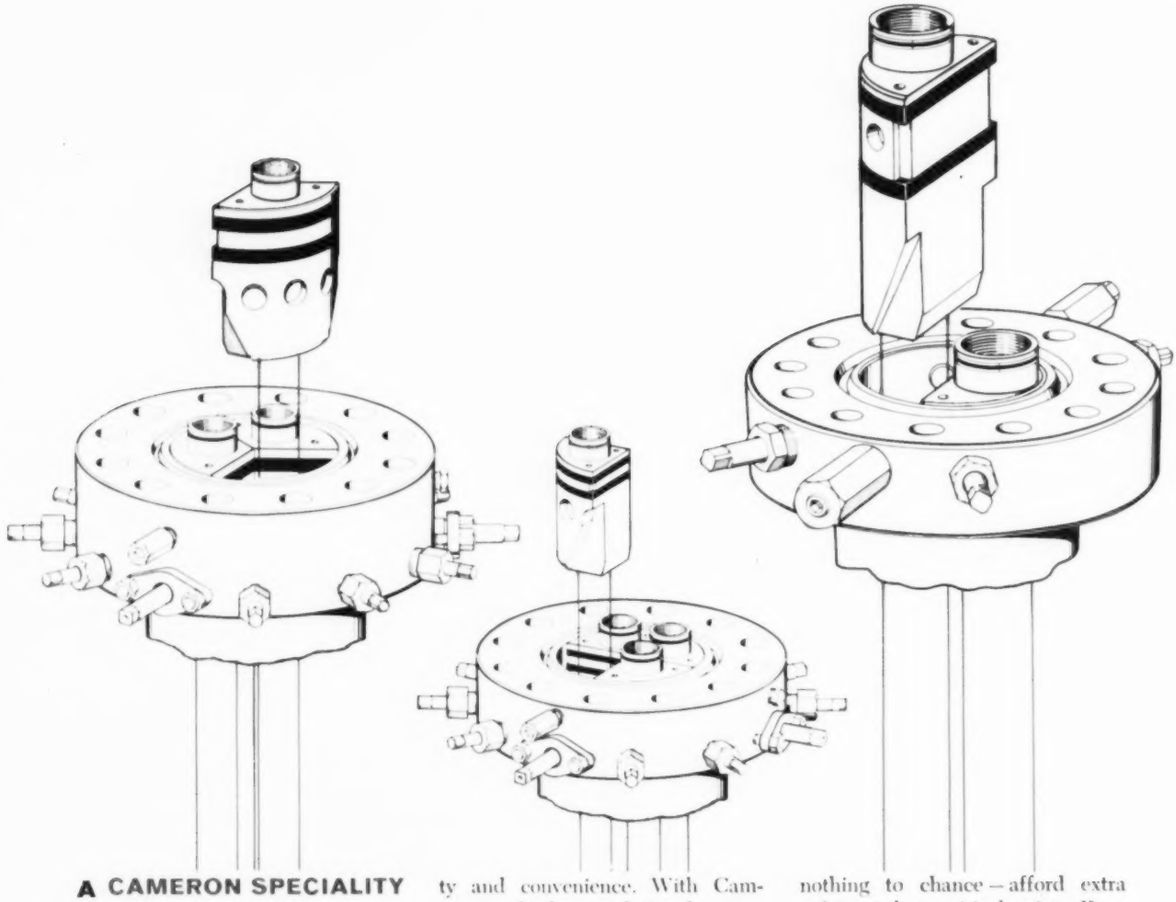

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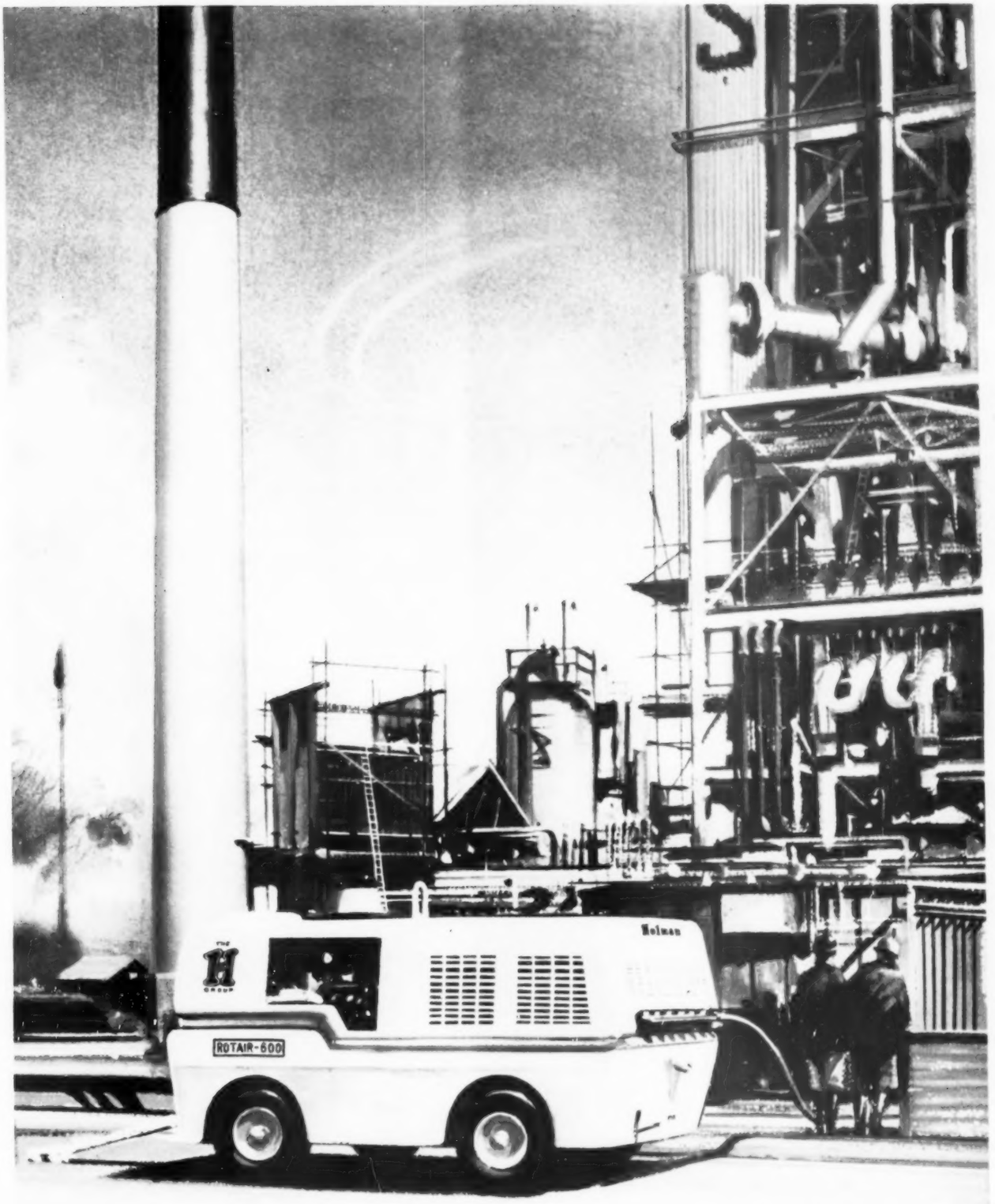

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LUMMUS ENGINEERS, CONSTRUCTS NEW 31,500 BARREL PER DAY REFINERY FOR ESSO STANDARD S.A.F. AT BORDEAUX

When Lummus completed construction this spring of Esso Standard's new Bordeaux refinery, it added 31,500 barrels per calendar day to France's refining capacity. The new Bordeaux installation is also the first refinery designed and built to operate on French crude. Crude flows through a 12" pipeline from Esso-REP's Parentis field south of Bordeaux.

In recent years *existing* refineries in France have expanded greatly. The new Bordeaux refinery, on the other hand, is a "grass roots" refinery – the second built in France since World War II–and Lummus has handled the engineering and construction of both.

Although the refinery will operate at 31,500 barrels per day initially, facilities are designed to permit expansion to a 45,800 B D throughput at minimum cost.

The refinery's design permits production of LPG, motor gasolines, jet fuels, kerosene, diesel fuels, heating oils, light and heavy fuel oil, and asphalts. Automatic blending equipment has been included to produce the various grades of asphalt required for the French market.

The Bordeaux refinery uses Esso Research and Engineering's "Hydro-Skimming" processing plan, which consists of atmospheric and vacuum distillation, with Hydrofining and Powerforming to produce the required gasolines. Light ends and treating sections are also included for both the pipestill and Powerformer.

In addition to product shipping facilities, Lummus also provided complete auxiliary and off-site facilities, including storage tanks, steam generation, cooling water, electric power, and air – plus the necessary piping, transfer pumping and TEL blending.

The Bordeaux project was handled by Lummus' French company, Societé Française des Techniques Lummus, with specialists from Lummus in the United States teaming up with those from Paris.

For design, engineering and construction of refineries anywhere in the world, contact one of the eight Lummus offices – and draw on more than 50 years' experience on over 800 major installations.

On the unusual heater exhaust system shown above, all vertical heaters exhaust into diagonal flues which feed one central stack.

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World Petroleum

THE MANAGEMENT PUBLICATION OF THE INTERNATIONAL PETROLEUM INDUSTRY

CONTENTS

4 Washington Pipeline, *by Joseph B. Huttlinger*
8 Canadian Notes
10 London Letter, *by Cecil W. Wood*
22 Venezuela
39 Editorial—We are Partners in This
40 South America's Refining Outlook Bright
44 Trinidad Looks Up
47 Oil's Struggle in Western Latin America, *by Dr. J. E. Rassmuss*
50 Synthesis Gas Plant at Ijmuiden, *by A. P. van Amstel*
52 Doodlebugs in Colombia's Sky, *by Fred L. Bernheimer and Jill C. Brown*
57 How Luminosity Affects Jet Fuel Qualities
60 Mobile Rigs Lick Libyan Desert Drilling Problems
62 Engineering and Research Reduces Oil's Capital Costs
64 U. S. Depletion Vs International Production, *by Dillard Spriggs and John Lichtblau*
68 World Petroleum Statistics
70 Isocracking—Cal Research's New Process
82 Oil Company Staff Changes
84 International News and Notes
96 Advertisers' Index

THIS MONTH'S COVER

Rig floor of a Shell rig in Venezuela showing crew members setting slips. Color plates are reproduced through the courtesy of the editors of Shell News, London.

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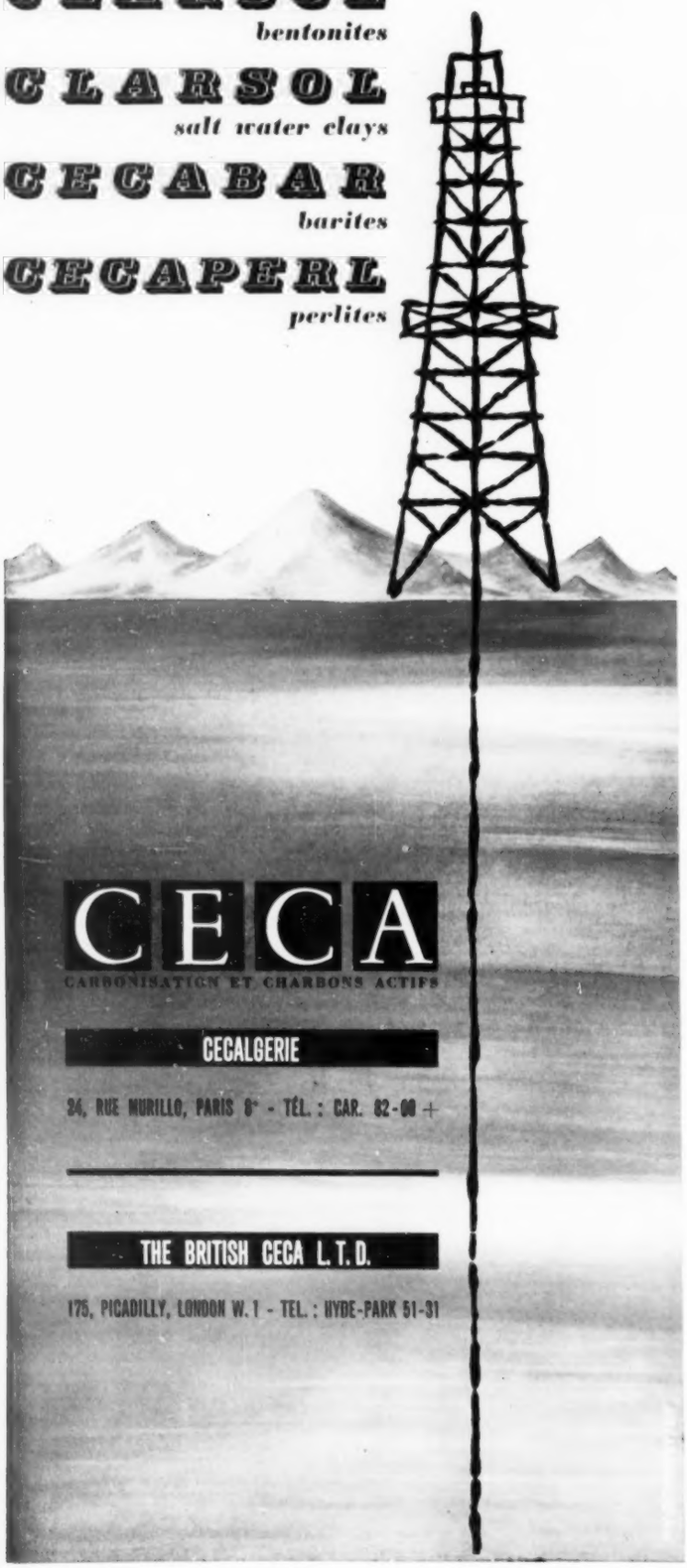

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Washington

by Joseph B. Huttlinger

Jets for Gas Pipelines

Natural gas industry executives have their eyes on the jet engine as the source of power for compressors on natural gas pipelines. Experiments so far indicate that it can be so used and at far less cost than conventional compressor plants. Columbia Gulf Transmission Co., Houston, has asked the Federal Power Commission for permission to try one out in actual use.

Colombia Gulf estimates that a gas turbine with jet engine power of 10,500 horsepower can be put up with a capital cost of $1,978,700. This compares to a cost of $3,980,000 for a conventional two-cycle reciprocating station. The figures break down to $190 per horsepower unit for the jet engine against $400 for the conventional, a cut of more than 50%.

Cost of service, which includes operating expense, depreciation, taxes and 6.25% return, are $50.30 per horsepower unit for the jet engine compressor against $85.23 for the conventional. The jet engine compressor plant, further, will be much lighter and smaller—ten tons versus 356 tons for a 10,500 horsepower plant—and thus suitable for remote areas. When the jet engine needs repair, it can be unhooked and sent to the factory, while a replacement engine is put into its place.

The Columbia Gulf proposal would use a Pratt and Whitney jet engine adopted to use natural gas as a fuel. The engine would be linked with a gas turbine developed by Cooper-Bessemer Corp.

Gasoline Taxes to Rise

Oil men trying to hold the line against additional increases in gasoline taxes may be fighting a losing battle. Virtually every responsible official of the government says he looks to the gasoline tax as the main source of revenues for highways.

And, further, these officials see a shortage of federal highway funds in years to come, despite the increase of one cent a gallon in the federal tax that became effective Oct. 4. That made the federal tax four cents a gallon. States have an average to 7 cents a gallon.

A study by the U. S. Bureau of Roads, due to be completed early in 1961, is said to point toward tapping other sources of revenue for highway funds on the theory that others than motorists benefit from highways.

Perhaps it was to cancel out the effects of any such report that President Eisenhower now has announced his own study of roads and their financing, under direction of General John S. Bragdon, his special assistant for public works planning.

FPC Threatens Depletion

Biggest danger to oil and gas producers in the current efforts of the Federal Power Commission to regulate their gas prices seems to lie in the threat to the income tax depletion allowance.

The FPC, being a body of reasonable men, is likely to come up

Pipeline

with a pattern of regulation in the end that will enable oil and gas producers to keep on finding and producing natural gas. But it may well repeal the incentive of the depletion allowance which Congress enacted into law, in setting the prices for gas. This shaped up as a central theme during final arguments before the commission in the test case, involving the Phillips Petroleum Co. A decision is expected early next year.

The commission's problem stems from the fact there are two bodies of law that it is directed to consider. On the one hand, there are tax laws giving incentives to oil and gas producers. Thus, oil and gas producers are permitted to deduct up to 27.5% of their gross income, within certain limits, before figuring income taxes. And, they are allowed to treat as expenses, to be written off in one year, certain drilling costs.

On the other hand, there is the Natural Gas Act, which provides for the commission to set just and reasonable rates for gas of natural gas companies. A gas producer now has been defined by the courts as a gas company. In setting the just price, the commission is relying, mostly, upon cost.

So, the question before the commission is this: Shall it treat as a cost only the actual taxes paid by a gas producer? Or should it treat as the cost the federal taxes that would have been paid without the benefits of depletion and expensing of drilling costs? .

If it takes the first course, the commission would be repealing, in effect, laws passed by Congress more than 30 years ago and again in 1954. If it allows as a cost the taxes that would have been paid, can it call the resulting gas price no more than just and reasonable?

The stakes are high for gas producers. Thus, Phillips claimed that allowing credit for the tax incentives would add $11 million to its cost of service base, which the FPC examiner found to be $57 million. Thus, allowing the tax benefits would boost costs more than one-sixth, and gas prices even more than this when a rate of return is added on.

The history of recent commission decisions on the tax incentives affords little grounds for optimism by the producers. Even in the recent case involving El Paso Natural Gas Co., the commission allowed benefits of the tax laws, but only instead of a fair return, not in addition to it. So, outlook is that the producers face an uphill fight to retain the tax benefits.

U. S. Oil Spends $2.6 Billion in '59

The U. S. petroleum industry will wind up 1959 spending $2,582 million for new plant and equipment according to a report by the U. S. Department of Commerce and the Securities and Exchange Commission. This is up 6% from the total of $2,431 million in 1958, but well below the total of $3,453 million in 1957. The spending, which has been picking up each quarter of this year is expected to reach $796 million in the fourth quarter. This compares with the low point of $518 million in the first quarter, the lowest level in any quarter of 1958 or 1959.

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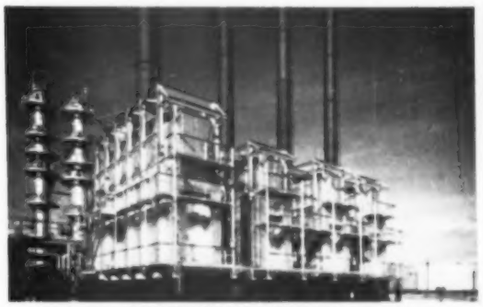

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As illustrated above, neither size nor location of the unit presents a problem to Lummus. These units are designed and engineered by the Lummus New York staff, who put the full benefit of their accumulated years of experience into each job. Procurement is made through the nearest of the five Lummus international group of companies and the cost of the job is payable in the currency of the country in which the procurement is handled!

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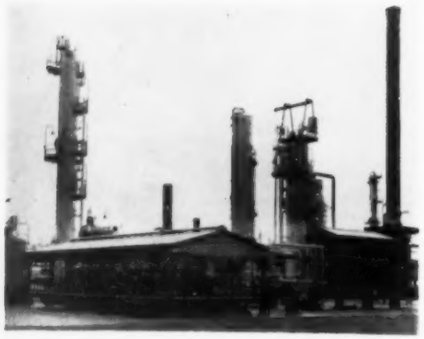
CANADIAN NOTES



New BA Desulfurizer at Clarkson

A new distillate desulfurization unit of 8,000 b/d capacity recently went on stream at The British American Oil Co. Ltd.'s Clarkson refinery. Canadian Kellogg Ltd., was contractor for complete design, engineering, procurement, and construction.

Canada's Well Completions Down

September well completions in western Canada numbered only 190, down 9% from last year's 208 in September. Alberta was up with 134, Saskatchewan down with 46, while Manitoba had 4 and British Columbia 6. Cumulative nine months' completions were 1,865 wells, down 2½% from last year's 1,913.

Pembina Flood Successful

A miscible flood program underway in Alberta's Pembina field is breaking all records for scope and underscores a growing recognition of the merits of this technique.

The project is being conducted within a unitized area, part of which has been selected for water flooding, north of midfield barrier of the Pembina field. The total project, covering about 46,000 acres, takes in approximately 20% of the field's total acreage. A total 573 wells are involved in the project and of this number 205 are located in the miscible flood areas of the unit and the balance in the water flood areas. Mobil Oil of Canada Ltd. is unit operator.

The Cardium reservoir of the unitized area has net oil in place amounting to approximately 708 million barrels. Of this, about 253 million barrels are in the miscible flooding sections and the remainder in the water flooding portions. Recovery by solution gas drive would amount to about 16%. Pressure maintenance by miscible flood is expected to result in 70% recovery of net oil in place while use of the water flood method promises recovery of some 35-40%.

In addition to advantages of greater efficiency, miscible is considered preferable to water flooding in another respect: Even in event of failure, the injected fluids can do no harm. There's also an advantage being taken into consideration at Pembina from a standpoint of production allowables, gas-oil penalties being offset when produced gas is reinjected into the formation.

Proration Studies in Saskatchewan

Possibility that eventually a system of oil prorationing will be adopted in Saskatchewan has led to preparatory studies of prorationing by the Saskatchewan government.

Officials said in Regina that while prorating is not expected to be necessary in the near future it might become necessary at some future date and the studies are being undertaken with that thought in mind.

Canada's Oil Market Policy

The Dominion Government has intimated that it will not make any decision about implementing the Borden Royal Commission proposals on crude oil markets. Instead it proposes to refer the whole matter to the National Energy Board for study. The industry fears that this will delay market development a long time, as the energy board is not expected to be functioning before January.

New Imperial Refinery Opened

Imperial Oil's new Calgary refinery was officially opened Monday, October 19, by Premier Ernest C. Manning of Alberta. The event marked the completion of a construction project involving the outlay of $14 millions which has been under way for more than a year. This is the largest single industrial project in Calgary's history and the largest ever undertaken at an oil refinery on the prairies.

With a capacity of 14,700 b/d, the new refinery will almost double the output of the old refinery, which began operating in 1923. The refinery property, totalling 340 acres, is on the left bank of the Bow River, southeast of Calgary.

Manager of the new plant is S. T. Reynolds, appointed in 1957. Refinery units include an atmospheric and vacuum distillation unit with a capacity of 14,700 b/d, a 7,000 b/d fluid catalytic cracking unit of the latest design, a 3,000 b/d Powerformer, and a new product quality control laboratory which embodies the latest in design and equipment.

Canadian Petroleum Merger

Canadian Western Oil Co., Inc., will merge with Bandini Petroleum Co. of Los Angeles, Westates Petroleum Co. of Tulsa, Okla., and Viking-Kinsella Gas Co. Inc. which has properties in Alberta. The new company, to be called Estates Petroleum, will have assets in the neighborhood of $20,000,000. Westates will have producing properties in Alberta, New Mexico, Texas, Wyoming, Oklahoma and California. It would have more than 350 producing oil and gas wells with proven and semi-proven reserves of approximately 24,000,000 bbl. of oil and 47,000,000,000 cubic ft. of gas.

Canada's Gas to U. S.

A series of steps directed at beating a path to the long sought goal of gas export on major scales to regions in the USA are being taken in Canada. Applications pending include those of Alberta and Southern Gas Co. Ltd., to serve California primarily; Westcoast Transmission Co. Ltd. to serve the U. S. Pacific Northwest; and Trans-Canada Pipe Lines Ltd., to carry out its export program at Emerson where Trans-Canada would sell 204 million cubic ft. of gas daily to Midwestern Gas Transmission Co.

Related to the applications of Alberta and Southern and of Westcoast Transmission is an application of Alberta Gas Trunk Line Co. Ltd., for a permit to build a foothills gas gathering system costing approximately $103 million.

The Alberta Oil and Gas Conservation Board was scheduled to start hearings on October 13 into Trans-Canada's request to take an additional 700 billion cubic ft. of gas daily from the province. Approval would give the company permission to remove a total 6.57 trillion cubic ft. of gas. The company has filed a request for a gas export license with the Minister of Trade and Commerce in Ottawa.

Charles P. Smith, the company's vice president, states that these hearings "will undoubtedly result in several important, and encouraging decisions that will greatly benefit the natural gas industry of Alberta and the general economy of Canada.

Canadian Crude Deliveries Up

Net deliveries of oil through Canadian pipelines during the first seven months of this year increased 13% to 179,325,682 bbl. from 158,739,299 in the correspond period of 1958, reports the Bureau of Statistics.

Oil Atomic Blast Delayed

Project Oilsand—which would result in release of energy equal to a "moderately large earthquake"—was quaking a bit itself in Canada this October under a bombardment of reports that the project planned by Richfield Oil Corp. would be held up indefinitely. These reports, widely published in Western Canada, apparently were based on statements made by federal Mines Minister Comtois, who later issued clarifying statements to the effect that the proposed tests seem out for the freeze-up of 1960 only. It has never been definite just when the tests would be held as this depended on the speed with which all necessary agreements were reached by government bodies in both the U. S. and Canada. Also, the staging of the nuclear blast would hinge on decisions of an international nature in connection with atomic explosions in any case. The target date now seems to be the winter of 1961 as the earliest possible time—taking into account the usual considerations. The Alberta Oil and Gas Conservation Board has made available a report of the Alberta Technical Committee as a study of the proposed tests.

J & L Supply Shifts

Two changes in the field sales force of Jones & Laughlin Supply Division were announced today by W. L. Wolfe, vice president-Sales. W. J. Chisholm, salesman at Edmonton, Alberta has been transferred to Calgary, Alberta. R. E. Haulk, store manager at Harvey, Louisiana has been assigned as salesman in the division's New Orleans office.

Newfoundland Terminal Opened

A new $300,000 marine terminal has been opened by British American Oil at Harbor Grace, Newfoundland. Cliff Petten, a native Newfoundlander, has been appointed branch and terminal superintendent. The 55,000-barrel terminal will handle tankers up to 15,500-tons.

Personals

J. A. ARMSTRONG, assistant manager of Imperial Oil's producing department, western region, Calgary, has accepted a position with Standard Oil Co. (N.J.) in New York, as assistant deputy coordinator of the producing department. Replacing him in Calgary will be **JOHN S. POYEN**, who has been assistant manager of the Edmonton division, producing department.

ARNE R. NIELSEN has been appointed exploration manager of the newly-created Denver Division of Mobil Oil Co. Mr. Nielsen had been chief geologist in Calgary for Mobil Oil of Canada since January, 1958.

KENNETH R. LORD has been promoted to division sales manager for the Edmonton (Alberta) division of Hughes Tool Service, Ltd. He replaces D. W. Potts, who has been transferred to Calgary as division sales manager.

JOHN F. LANGSTON, P. Eng., chairman of Scurry-Rainbow Oil Ltd., has been elected president of the company. He is also managing director of Denton-Spencer Co. Ltd., a petroleum engineering consulting service.

D. L. FULLER is the new operations manager of Producers Pipelines Ltd., Regina. He has aided in the design and construction of pipelines in Ontario, Manitoba, Alberta and Saskatchewan.

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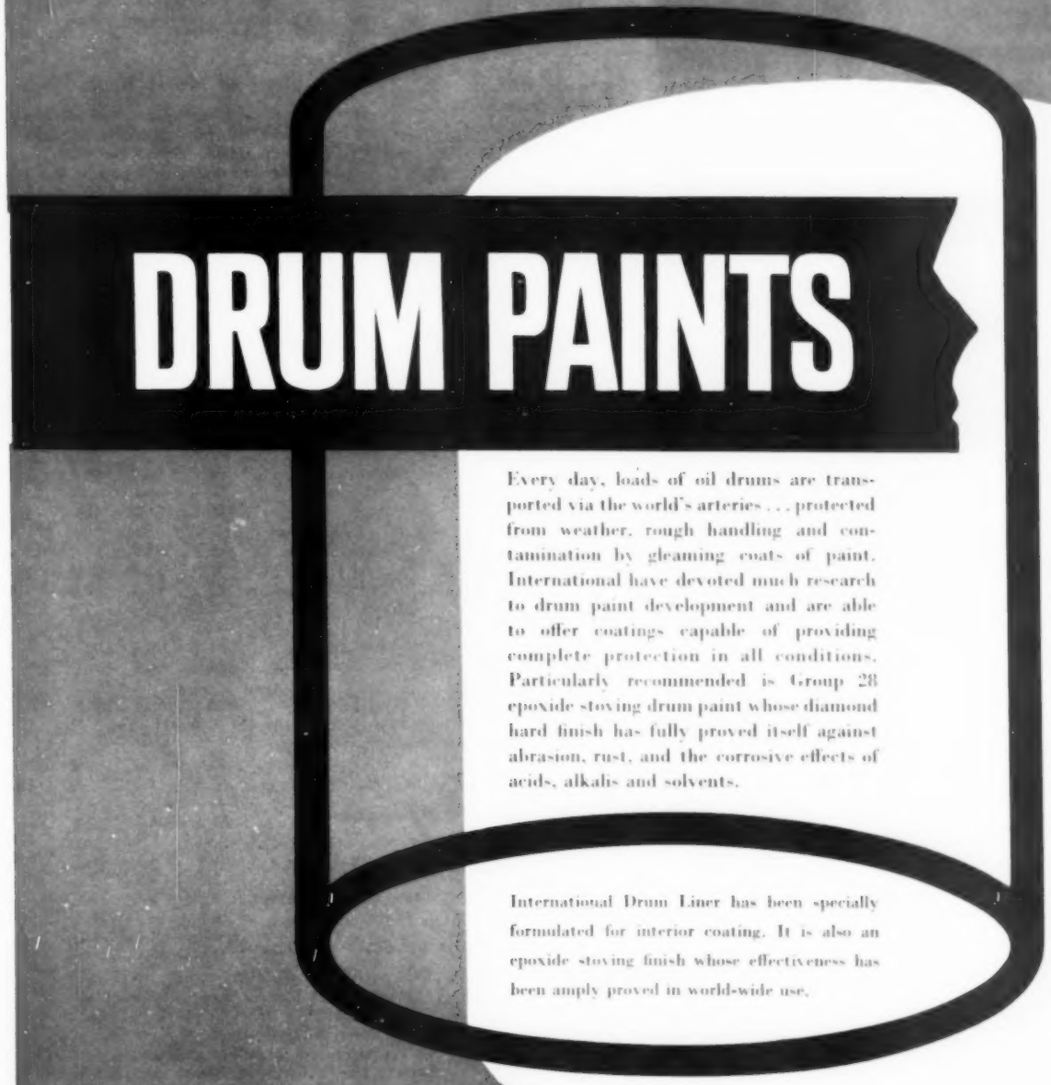

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LONDON LETTER

by Cecil W. Wood

Chairman of the C.B.M.P.E. Mr. G. H. Thorne (left) with the principal speaker and guest of honour, Dr. James Burns, C.M., B.Sc., F.Inst.F.

More Projects for British Equipment

G. H. Thorne, chairman of the Council of British Manufacturers of Petroleum Equipment and joint managing director of Dawnays Ltd., speaking at the annual dinner in October, said it was a year covered by several outstanding events for the council. Referring to the new subsidiary, British Oil Equipment Credits Ltd., and its £3½ million contract with Pemex, he said it is understood that this project alone may be increased to £7 million, "and we have heard of another large project in Latin America where, too, the Credits Co. may be able to assist. We have also projects under consideration in other parts of the world."

New Liquid Methane Carrier Planned

Within "a few weeks" the Gas Council hopes to propose to the Minister of Power building of either one 20,000-ton liquid methane carrier or, more likely, two 10,000-tonners, according to Sir Harold Smith, chairman of the Gas Council. He thought there was little doubt the vessel would be built in Britain.

He paid a warm tribute to American cooperation in the work done by Constock International Methane in delivering five 2,000-ton cargos to Canvey Island (Essex) since February, and termed this development as "the most spectacular thing done by the council for several years." Seven trial deliveries are planned but the experimental work is already regarded as technically successful and the tanker as running on a normal regular schedule.

Natural gas in its liquid state contains about 530 therms per ton but, after allowing for losses during the voyages of the "Methane Pioneer" and conversion processes, the net quantity of gas available has been about 480 therms per ton. Such small shiploads are not economic, however, said Sir Harold, but the council is satisfied it is right to go ahead with this new raw material for town gas production, hence the plan for larger carriers. A 20,000-tonner, doing 13 to 14 trips a year, would carry the equivalent of two million tons of coal a year, or sufficient for a year's gas supply for over a million of the council's 12 million customers. The cost to the council of this work to date was given as £1,200,000, with Constock having spent an equal sum plus a large amount of research. Sir Harold also mentioned that the possibility of importing Middle East gas in liquid form is being investigated.

He expressed great disappointment at the results of the search for indigenous natural gas, especially in Yorkshire. More wells are to be drilled in various areas and, meanwhile, area gas boards have started drawing gas from wells in Cousland (Scotland) and near Whitby (Yorkshire). It has not yet been possible to determine the Cousland reserves but those near Whitby are certainly sufficient to supply the district for 30 years.

The highly detailed annual report for the year ended March 31, 1959, gives the quantity of tail gases bought from oil refineries and reformed as 64.7 million therms against 20.2 million in 1957-58, supplying 2.2% of the total gas required against 0.7%. Oil purchased for gas making and associated purposes rose to 707,000 tons from 600,000 tons; oil gasification plant capacity to 128.5 from 57 million cu ft/day and the oil used in this way to 144,800 from 65,700 tons; and the gas made to 41,565,000 from 16,231,000 therms. The report also provides ample evidence of progress in research and [illegible]at development in many avenues of petroleum uti[illegible]tion by gasification, hydrogenation and catalysis. [illegible] showing that the British Gas Council is determin[illegible] to rely increasingly on petroleum as a major sou[illegible]e of town gas supply.

New Type Rail Tank Cars

Mobil Oil has introduced a new railway bridging service from its Coryton (Essex) terminal to Coventry, whereby block trains of 20 petroleum tank cars, running on a timetable schedule, will each transport nearly 120,000 gallons of products. These cars, built by Powell Duffryn Ltd., will be the first of their kind to be used for gasoline operations in the UK. Special Emsco valves beneath each car replace the customary filling points and simplify operations by permitting ground-level control of loading and unloading.

USA Equipment Links

U. S. Industries Inc., New York, through U. S. Industries (Great Britain) Ltd., has bought for cash the Burtonwood Engineering Co., whose works near Warrington, Lancs., are mainly concerned with producing oil well equipment. The American concern, which makes a broadly similar range of products, plans large-scale expansion of the Burtonwood business, already with a turnover of about £1¼ million a year. It expects to double this figure within 18 months and places great hopes on the oil development in North Africa. Further expansion of UK business should come about through the acquisition, now under negotiation, of a subsidiary of a major British company, as yet unnamed. U. S. Industries Inc. has had links with the UK for some years through its manufacturing arrangement with Vickers-Armstrongs.

Natural Gas For Whitby

British Petroleum and Imperial Chemical Industries are to supply the North Eastern Gas Board with natural gas from wells in Eskdale near Whitby (Yorks.). The board is arranging to pipe the gas to its Whitby works before feeding it into the normal coal gas main supply.

This gas was found by BP in 1938 while looking for oil and the discovery was followed by further exploration after the war jointly with ICI with a view to its possible industrial use for chemical manufacture, but ICI decided reserves were insufficient for its requirements from the long-term aspect.

British Equipment Notes

Woodfield Pickering Ltd. has been formed with headquarters at Wishaw, Lanarkshire, to provide complete offshore drilling equipment as a package deal. This represents a partnership of physical resources between Woodfield (Rochester) Ltd. and R. Y. Pickering & Co. Ltd., a member of the Lithgow group of shipbuilding and engineering concerns on Clydeside. The hulls of marine drilling platforms will be made by Fairfield Shipbuilding & Engineering Co. at Govan. Joint managing directors of the new company are Dr. T. Scott Glover (managing director of Pickering) and R. Keir Watson (managing director of Woodfield).

Turriff-Burden Ltd., an association of the Turriff Construction Corp., London, and Burden Construction Corp., Tulsa, has secured a contract from Iraq Petroleum Co. worth "many millions of pounds": for building 314 miles of 30-in. and 32-in., pipeline in Iraq. Construction work is to begin immediately.

Evershed & Vignoles Ltd., London, has formed a new company in Canada, Evershed-Powertronic Ltd., with headquarters at Toronto, to consolidate the successes of Evershed & Vignoles (Canada) Ltd. in securing contracts for important electronic control installations.

Stewarts & Lloyds Ltd. and Imperial Chemical Industries Ltd. are forming a joint company to manufacture all kinds of extended tubing in steel. It will make "Applied Fin Tubing" with a wound-on and welded fin and "Integron" integrally finned steel tubing, the manufacturing facilities for which will be transferred by ICI to the new organization.

The English Electric Co. now has in the final assembly stages at its Stafford works three of the seven 66 kV single tank circuit-breakers being made for Iraq Petroleum Co. These will form part of a 7-circuit switching station associated with a large water injection system to be installed in the Zab area. The pumps for this system will be driven by three English Electric 5,500 kw gas turbines.

Rubber Tanks for Oil Distribution

Successful trials have been held in Australia with collapsible rubber tanks for transporting up to 1,200 gallons of gasoline and other refined oils on a semi-trailer truck. As a result, three 1,000-gallon rubber tanks are being installed on all the trucks of one of BP Australia's distributors. Though unbaffled, little tank surge is reported.

U. S. Share of World Refining

The U. S. share of free world crude oil refining capacity fell slightly last year to 65.8% at end-1958 from 66.2% at end-1957. This is revealed in an assessment of ownership made by Petroleum Information Bureau (London). The British and British/Dutch share—the two cannot be segregated—rose slightly to 16.9% from 16.7%. The world position can be summarized thus from the individual country details:

OWNERSHIP OF WORLD CRUDE OIL REFINING CAPACITY
at December 31, 1958

	United States	British and British/ Dutch	Others	Total
	Million metric tons			
Western Hemisphere				
North America	466.6	33.3	18.0	517.9
Latin America	68.9	28.9	40.0	137.8
Total	535.5	62.2	58.0	655.7
Eastern Hemisphere				
Western Europe ...	42.1	63.7	57.6	163.4
Middle East	30.9	11.7	27.6	70.2
Far East/Australasia	17.2	23.3	18.2	58.7
Africa	1.0	...	3.5	4.5
Total	91.2	98.7	106.9	296.8
Total Free World	626.7	160.9	164.9	952.5
USSR bloc	...	...	129.2	129.2
TOTAL WORLD ...	626.7	160.9	294.1	1,081.7
	Per cent (Free World—100)			
Western Hemisphere				
North America	49.0	3.5	1.9	54.4
Latin America	7.2	3.0	4.2	14.4
Total	56.2	6.5	6.1	68.8
Eastern Hemisphere				
Western Europe ...	4.4	6.7	6.1	17.2
Middle East	3.2	1.3	2.9	7.4
Far East/Australasia	1.8	2.4	1.9	6.1
Africa	0.1	...	0.4	0.5
Total	9.5	10.4	11.3	31.2
TOTAL FREE WORLD	65.9	16.9	17.3	100.0

For comparison the end-1957 ownership position for the free world (in million metric tons) was: United States, 586.8 (66.2%); British and British/Dutch, 148.1 (16.7%); others, 151.7 (17.1%); total, 886.6.

A point of economic interest in the end-1958 free world picture is that of the 164,900,000 metric tons capacity owned by "others," 72,465,000 tons (7.6% of world total) was owned by governments—36,375,000 tons of which was in Latin America and 27,410,000 tons in the Middle East.

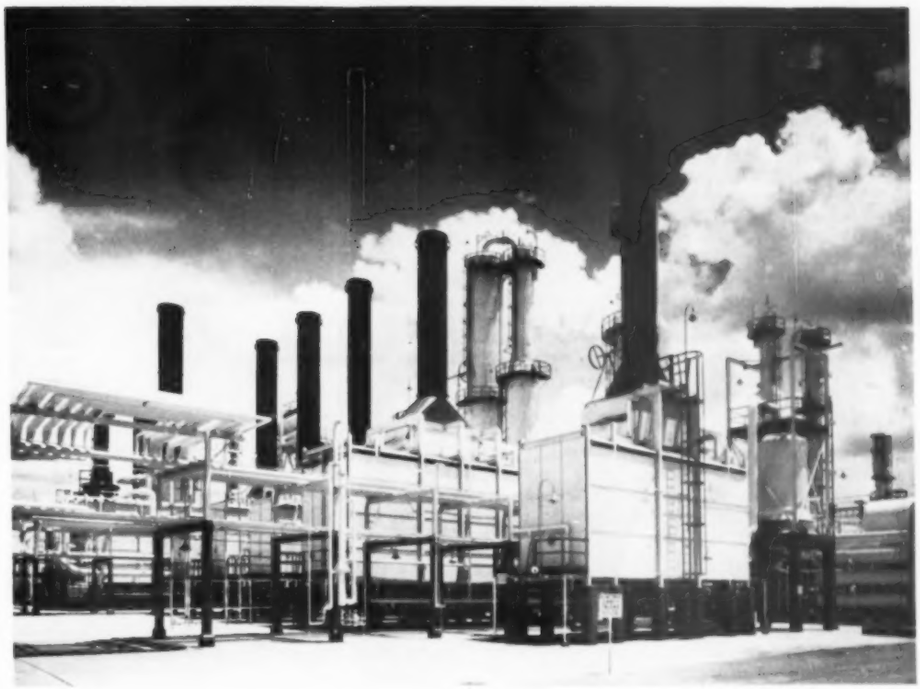
New Tanker Heating System

The initial installation of the "Alagrid" parallel-flow system of aluminum-brass heater coils in an Esso Petroleum tanker is reported to have been successfully tested at sea and to have indicated higher heating efficiency than conventional methods. The manufacturers, Steels Engineering Installations Ltd., of Sunderland, claim this as the first heater system incorporating small-bore pipe to be fully and successfully tested at sea.

(*Continued on page 12*)

BORN BUILDS BETTER HEATERS BORN BUILDS BETTER HEATERS BORN BUILDS BETTER HEATERS

BORN BUILDS BETTER HEATERS FOR REFINERIES



Dependability . . . economical operation . . . these are synonomous with BORN HEATERS. Because they have the knowledge accumulated by specializing in the field of process heating since 1915, Born engineers have developed heaters that have low first cost . . . maximum fuel efficiencies . . . extra close control . . . negligible maintenance costs ***plus*** exclusive safety features.

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H. & E. Liddell, Ltd.
Horsham, Sussex, England.

IN FRANCE:
Sacana
Paris, France

BORN Engineering Company
Manufacturers of Direct-Fired "UPFLO" Heaters
TULSA, OKLAHOMA

BORN BUILDS BETTER HEATERS BORN BUILDS BETTER HEATERS BORN BUILDS BETTER HEATERS

Tanker With All Accommodation Aft

The 19,430-dwt tanker built by J. L. Thompson & Sons at Sunderland for Shell Tankers, and which has just gone into service, is the first British-built vessel of this type to have its entire accommodation, navigating space and services at the after end. The new design, giving the officer in charge a clear view of the deck, is held to make for greater ease of control in handling cargo. The steam turbine "Aluco" is designed as a permanent white oil carrier.

New Publications

Basic Road Statistics 1959—Its many tables compiled by the British Road Federation afford a mine of statistical information on Great Britain and Northern Ireland under 7 sections, viz: (i) motor vehicles; (ii) road traffic and accidents; (iii) transport industry; (iv) roads; (v) motor taxation; (vi) road transport legislation; and (vii) Northern Ireland. Published by BRF, 26 Manchester Square, London, W.1., price one shilling.

Catalyst No. 2, Autumn 1959—Issue No. 2 contains less of general popular magazine stuff and more of the type of material that seems to fit in with an industrial magazine—and for which there is a growing readership. Under this we class the account of Italian industrial chemical developments, the review of the British anti-freeze market, and especially the "ethylene story."

Proceedings of the Third Technical Congress of European Petroleum Equipment Manufacturers, Paris, June 1959—The 20 papers presented at this meeting are now available in one volume in English, French and German, with their accompanying drawings, graphs, etc., in a separate small publication a method of presentation which has nothing to recommend it from the reader aspect. Available from FECEP, 44 bis, Rue Pasquier, Paris 8, price £4 (US $11.50) including postage.

Ministry of Power Statistical Digest 1958—This covers the production, consumption and utilization of all forms of fuel in the UK, and the value of its already extensive section on petroleum is further enhanced. Capacity figures are given for the first time on individual refineries back to 1953, and other new tables cover imports by consigning countries, exports by destination, separate consumption figures for Scotland and N. Ireland, and limited liquid fuel stock data. Available from HM Stationery Office, Kingsway, London, W.C. 2, price £1 17s. 6d. net.

Sarkosyls and Amine O Rust Inhibitors—A detailed 23-page on two rust preventatives marketed by The Geigy Co. Ltd. One is based on N-methyl glycine and the other is a substituted imidazoline. Full technical information is given on properties, methods of usage, and the results that have been obtained when used separately or together. In the latter case they are shown to be extremely effective for corrosion inhibition. Technical Service Bulletin No. 4 is available from the company at Rhodes, Middleton, Manchester.

Nigeria Field Appraisal Completed

Completion of the 12th well in the Bomu area of Nigeria as a producer from 7,600 ft. marks the end of the first stage of Shell-BP's appraisal program for this field, which is in the eastern region, near Port Harcourt. Completion in September of the 14-mile, 12-in. pipeline link with the Afam-Port Harcourt line partially removed the previous restriction on production caused by the necessity for barge transportation. Full realization of the field potential, however, must await mid-1960, when the line to Bonny, 40 miles south of Port Harcourt and at the mouth of the River Bonny, should be completed and the ocean tanker loading terminal also ready. Meanwhile, exploration continues actively in several other areas of Nigeria.

BP Sales at $842 Million

Net Group sales and other income of The British Petroleum Co. Ltd. amounted to £301,007,000 ($842,819,600) for the first half of 1959 compared with £303,401,000 ($849,522,800) for the same period a year ago, according to the company's semi-annual report. Net income for the six months ended June 30, 1959 amounted to £23,461,000 ($65,690,800) as against £25,934,000 ($72,615,200) for the first half of 1958.

Sales of crude oil and refined products of the BP Group amounted to 31 million tons for the first half of the year, unchanged from the corresponding 1958 period. Directors have declared an interim dividend in respect of 1959 results on the common stock of eight pence (approximately 9 cents) per £1 stock unit. It is payable, free of British income tax, on October 31, 1959.

US Equipment Links

Koch patented "Flexitrays" are being introduced into the UK under a manufacturing licence granted to Archibold Low & Sons Ltd., of Glasgow. Over 1,000 installations of Flexitrays are said to be in use in US refineries and they are claimed to have capacities equal to a well-designed sieve tray combined with an efficient operating range exceeding bell-cap trays. A feature of design is the use of liftable caps of about 2-in. diameter which operate like check valves.

Entering Tanker Field

Stevinson Hardy (Tankers) Ltd. has been formed as a subsidiary of Stevinson, Hardy & Co. Ltd. to acquire on delivery the 45,000 dwt steam turbine tanker being built for the parent company. Delivery is due about August 1960 and the vessel is let under time charter by demise to Shell for a 20-year period.

Britain's Biggest Tanker Launched

Britain's biggest tanker was launched September 16. The vessel will join The British Petroleum Co.'s fleet. The tanker, "BRITISH QUEEN," which is BP Tanker Co.'s first 50,000 dwt vessel, has an overall length of 760 ft. and a breadth of 97 ft. Her single screw, driven by steam turbines capable of developing a maximum of 17,600 shaft horsepower, will give her a loaded speed of 15½ knots. It was built by John Brown and Company in the Clydeside yards.

Accommodation for all her crew, except apprentices and boys, will be in single, air-conditioned cabins. A swimming pool will be built on the aft boat-deck.

Personals

F. W. BRAYBROOK, general manager of Petrochemicals Ltd. since 1955, has taken up a similar appointment in the Shell group responsible to the director of coordination—chemicals in Shell International Chemical Co. His previous managerial functions with Petrochemicals will in the future be the responsibility of Shell Chemical Co. management.

R. J. PINDER, joint managing director of Esso Petroleum, has been elected chairman of Cleveland Petroleum, an Esso subsidiary. He succeeds H. C. Tett, who relinquishes this position to devote more time to his duties as Esso chairman. **W. H. CRITCHLOW** has been appointed a director of Cleveland.

J. B. SCOTT, Shell finance manager in London since July 1957, has been appointed group finance coordinator of Shell International Petroleum and at the end of the year will go to Toronto to take up the position of vice president finance of Canadian Shell, the group's main holding in the western hemisphere. He will then be replaced in London by **G. B. HUISKAMP**, at present finance manager of Bataafse Internationale Petroleum.

Emile E. Soubry, executive vice president and director, Standard Oil (New Jersey) shakes hands with Premier Adnana Menderes of Turkey at a Foreign Policy Association luncheon attended by 1,200 business and civic leaders October 13, 1959, in the Grand Ballroom of the Waldorf-Astoria. Mr. Soubry is chairman of the petroleum industry committee for fund-raising in behalf of the Foreign Policy Association's $1-million campaign in support of its citizen education program in foreign policy. The need to create a greater public understanding of world affairs has been described by President Eisenhower as "the Number One problem for the United States."

Suez To Be Deepened

The Suez Canal is to be deepened for larger and larger tankers, according to Col. Mahmoud Younes, head of the Suez Canal Authority. Since taking over the Canal three years ago, Col. Younes has deepened the canal to 35 ft. for transit of deeply laden oil tankers and is operating it without serious delays. Presently it is being dredged to greater depths with an eye to passage of "super tankers."

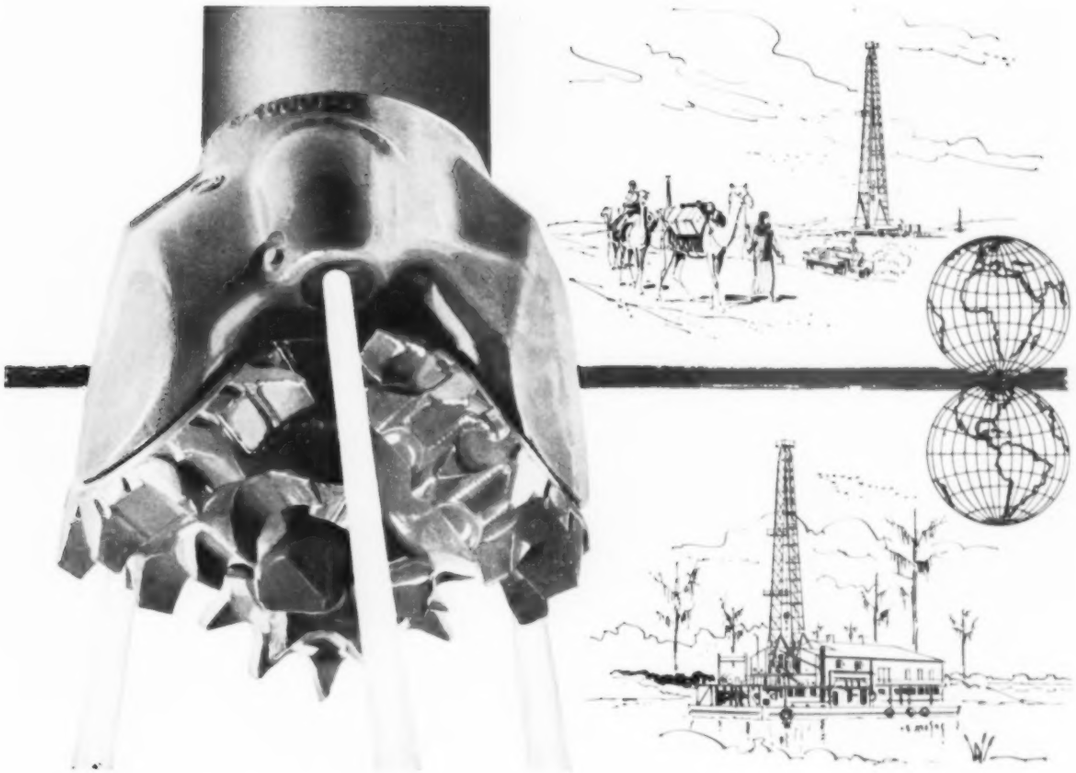
Colonel Younes' record for 1958 is summarized in an annual report on the Canal's operations. Copies are available from the Consulate of the UAR in New York.

The world's two largest tugs, each of 6,000 hp, have been purchased and are in use in the Canal. Their principal function is to free any ship that runs aground during transmit. 233 pilots are employed on the Canal now. Of the total, 113 are of other than UAR (Egyptian or Syrian) nationality. A training program is underway, preparing pilots for the eventual replacement of all by UAR pilots when contracts now in effect have expired.

Among other projects are a floating drydock at Port Said with 25,000 tons capacity. Provision is being made as well for navigation in the Gulf of Suez by Suez pilots. At present navigation only is available within the Canal.

Atlantic Net Up 28%

Earnings of The Atlantic Refining Co. for the first nine months of 1959 were 25% ahead of the same period last year. Net income for the period amounted to $23,975,000 compared with $19,180,000 in 1958. Sales and other operating revenue increased to $401,231,000 or nearly $13 million better than a year ago. Production of crude oil for the nine-month period was 16% over last year. This resulted partially from a greater number of permissible producing days in the southwest plus our higher rate of new well completions and steadily increasing volumes from our holdings in Lake Maracaibo, Venezuela. Volumetric gains of 4% and 5% respectively were also registered in refinery runs and product sales.



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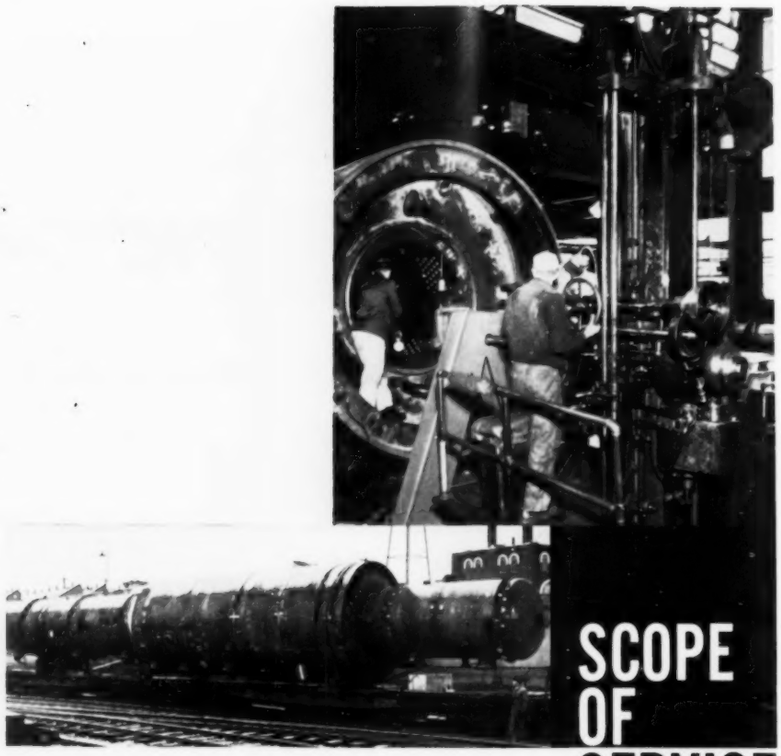

SCOPE OF SERVICE

For 43 years the facilities of this large and well-equipped plant for ship and engine building have been employed in building special equipment for oil refineries and chemical plants.

This equipment varies from small tanks to large Fractionating Towers, Stills, Pressure Vessels, Special Machinery, Plate Work, etc. Carbon or alloy steel-annealed and X-rayed.

THE PLANT—Our plant consists of such a variety of shops and machinery that it is unnecessary to sublet when building the type of equipment here listed. The plant consists of:

Boiler and Tank Shops

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Blacksmith Shop	Pipe Shop
Anglesmith Shop	Electric Welding
Coppersmith Shop	Stainless Shop

RAIL OR WATER SHIPMENT—Our plant, located on the Delaware River with piers and deep water to care for sea going ships, has railroad connections to all points.

We have adequate facilities to handle our work in all its phases and do not have to sublet.

Further information, estimates or proposals on request.

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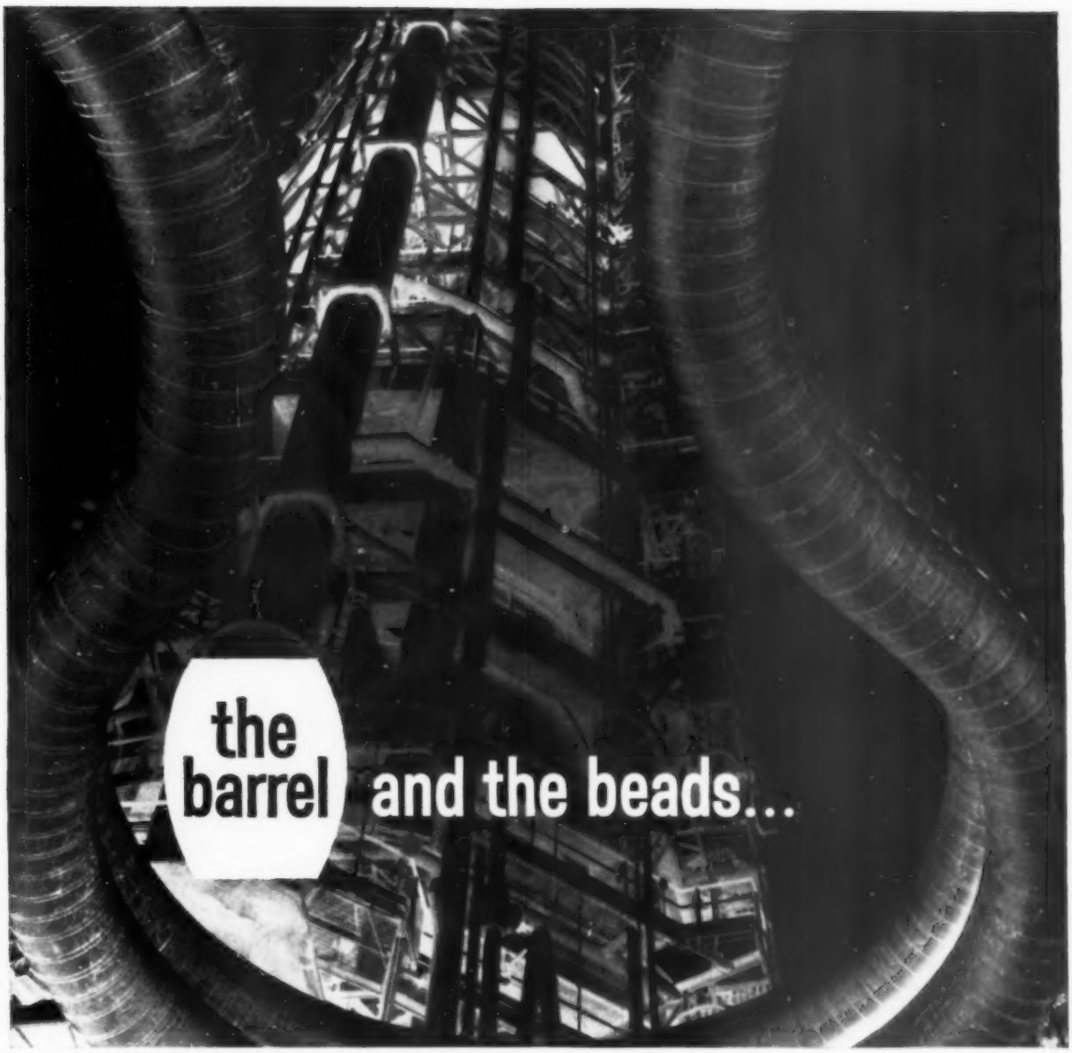

How to get more yield from a barrel of crude for less cost—the new bead catalyst that makes it possible—what it means to the petroleum industry

Petroleum refiners around the world have always had one common economic objective—to get more yield from every barrel of crude oil at lower cost.

Socony Mobil's contributions toward this goal have been outstanding. From the development of the first Thermofor Catalytic Cracking unit and its successor, the Airlift TCC, to the introduction of Durabead, the most efficient, cost-cutting bead catalyst today, Mobil Catalyst Research has led the way in pushing yield levels ever higher, yield costs ever lower.

Now Mobil takes the lead again with Heavy Durabead, a new bead catalyst with all the features of Durabead, plus important new advantages. Heavy Durabead can cut TCC unit construction costs as much as 20%. Used in present TCC units, it can increase reactor and regenerator capacities up to 50%, compared to chrome bead catalyst.

* * *

These are the results of Mobil Catalyst leadership—*greater yields of salable products from every crude oil barrel, increased profits for TCC licensees and operators of other moving bed units in the petroleum industry.*

Socony Mobil Oil Company

Leader in catalyst research

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For any secondary recovery method ...look to Gardner-Denver equipment

Water flooding

Gas injection

Miscible phase

In situ combustion

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Gas slug drive

RESEARCH TAKES A LONG VIEW

At the start of our second century Gardner-Denver men are calling on the knowledge and experience of a century of progress to develop new and better ways of helping the men of industry, construction, mining and petroleum multiply productiveness and build a better world.

In oil company laboratories Gardner-Denver secondary recovery specialists work side by side with petroleum engineers to develop pilot plant equipment. On field tests Gardner-Denver men and equipment help work out practical applications.

When new secondary recovery projects get under way, equipment specifications call for Gardner-Denver. Dependable, field-proven Gardner-Denver pumps and compressors are available in a wide range of capacities and pressures. Complete packaged units are assembled, tested and shipped from our Dallas oil field plant.

Consult with Gardner-Denver specialists on any secondary recovery problem—anywhere in the world. Specify Gardner-Denver compressors and pumps with confidence. Call or write for details.

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GOODYEAR

TERRA-TIRES "FLOAT" YOUR TRUCKS RIGHT OVER THE TOUGHEST TERRAIN . . .

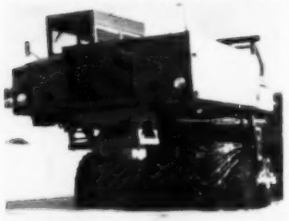
Goodyear's famous Terra-Tires *start* proving themselves where the road *stops*.

Their wide, flat "footprint" rolls easily over soft, unstable surfaces without digging in. Operating at very low pressures (as low as 2 psi), these superstrong Terra-Tires travel over highways at regular speeds, keep right on going across muddy marshlands, deep snow, rocky or stump-strewn terrain.

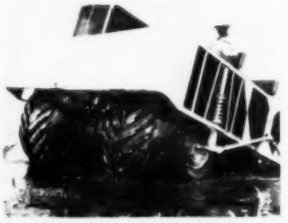
Put your men and equipment on Terra-Tires—they'll take you virtually anywhere you want to go!

Tests prove Terra-Tire has "go-anywhere" ability

DESERT SAND. In actual test, truck (weighing 15,800 pounds) rolls on Terra-Tires over treacherous sand. Truck never bogged down, never lost traction.

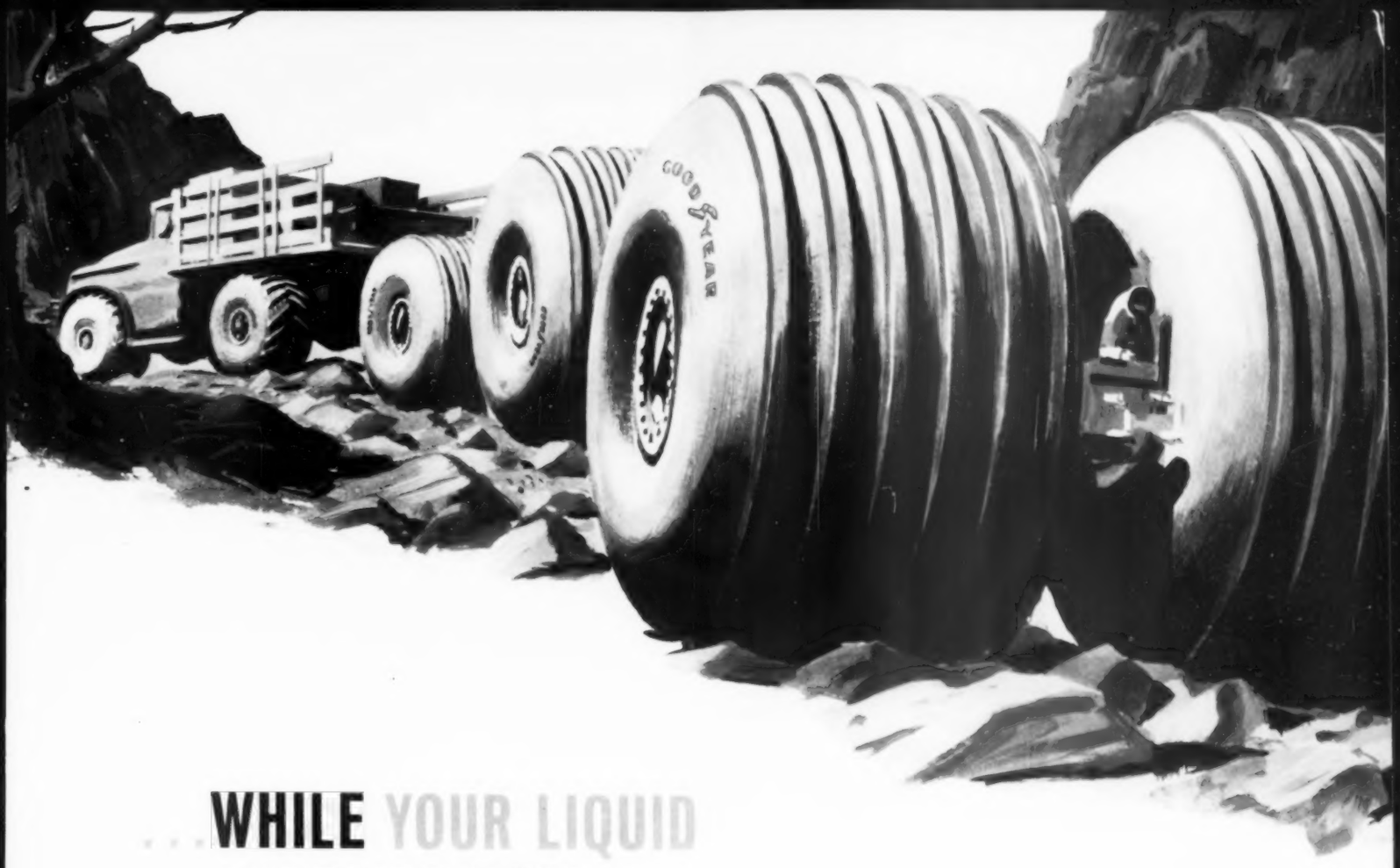


ARCTIC SNOW. Terracruzer vehicle cruises easily over 12 inches of fresh snow on 25% grade with 12-ton load.



MARSHLAND MUD. Terra-Tires carry a Marshbuggy through knee-deep mud of Louisiana swamp. They can support 4000-pound cargo *plus* weight of buggy.

TROPICAL JUNGLE. Planters save time and money by hauling bananas from remote groves on carrier with Terra-Tires. So soft is ride that fruit is unbruised.



. . . WHILE YOUR LIQUID SUPPLIES ROLL ALONG BEHIND YOU!

Each of these unique Rolli-Tankers by Goodyear can carry up to 500 gallons of fuel or other liquids almost *anywhere!*

Sand, snow, ice, mud, swamps—even rocky, rutted ground—can't stop these tire-like containers. Their low rolling resistance means towing vehicles can also carry major loads—paying off in bigger pay loads, lower haulage costs, faster deliveries.

Filled with fluid, Rolli-Tankers float in water, can be towed ashore to roll right up the beach. They can even be shipped by plane and dropped by parachute. They re available in capacities from 110 to 500 gallons.

More than 150 different liquids can be hauled in the Rolli-Tanker.

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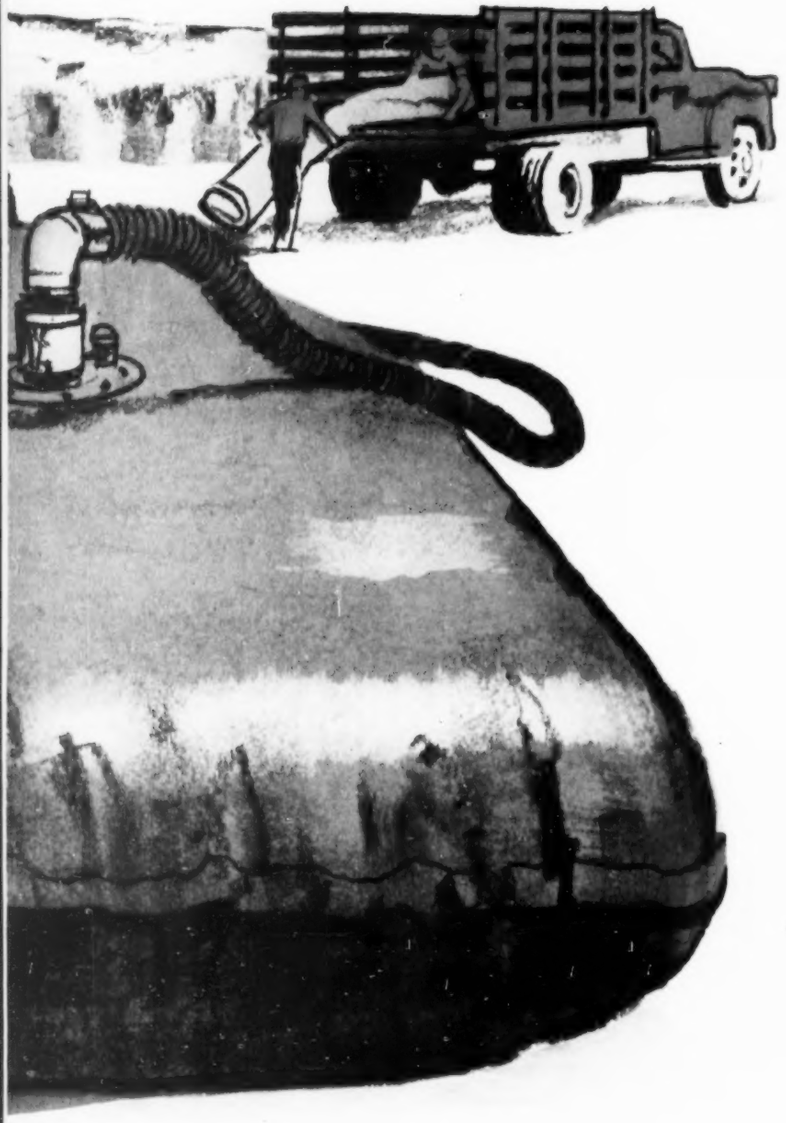
Fire-fighting chemicals can be delivered to remote operating sites for use or storage.

Others include: liquid fertilizer, insecticides, acetylene, boric acid, butane, corn oil, ethyl chloride, glycerin, hydraulic oil, kerosene, linseed oil, napalm, soap solution, turpentine, zinc chloride. (Rolli-Tankers can be made in special rubber compounds for certain chemicals, in addition.)

GOODYEAR



SAVE ON FUEL TRANSPORTATION AND STORAGE COSTS WITH THE TANK THAT UNROLLS LIKE A RUG!

For top economy in fuel or liquid transportation or storage, consider Goodyear's collapsible, portable "Pillow Tank." This tough, rubberized fabric container unrolls like a rug, can be filled and pumping 15 minutes after delivery, eliminates need for heavy, hard-to-handle steel drums.

Pillow Tanks are ideal for use at remote operating sites as temporary fuel stations for off-the-road equipment. This eliminates backtracking to a central fuel depot—saves time and money.

Here is the answer to your bulk liquid transportation problems, too. Any truck becomes a tank car when Pillow Tanks are used. And, you get the advantage of a two-way payload, for on the return trip you merely roll up the emptied Pillow Tank and throw it on the truck with the return load.

You can store gasoline, oil, water, *any* bulk liquid—even granular solids—in these ingenious tanks. They come in sizes up to 50,000 gallons. They're lightweight, too—the 10,000-gallon tank weighs only 370 pounds!

GOODYEAR MATERIALS CONTAINERS

Now—Goodyear Materials Containers for shipping, storing and handling loose, dry materials or liquids. Weatherproofing makes them equally useful indoors or out, and when empty they collapse to 10% of former size. Can be used over and over again for a variety of materials including cement, chemical resins, alumina and many other products.

Yes, these unique rubberized products by Goodyear assure you unprecedented mobility and substantial savings in pressing the endless search for more oil. These Goodyear developments enable you to reach and work in areas of the world never before accessible to wheeled equipment.

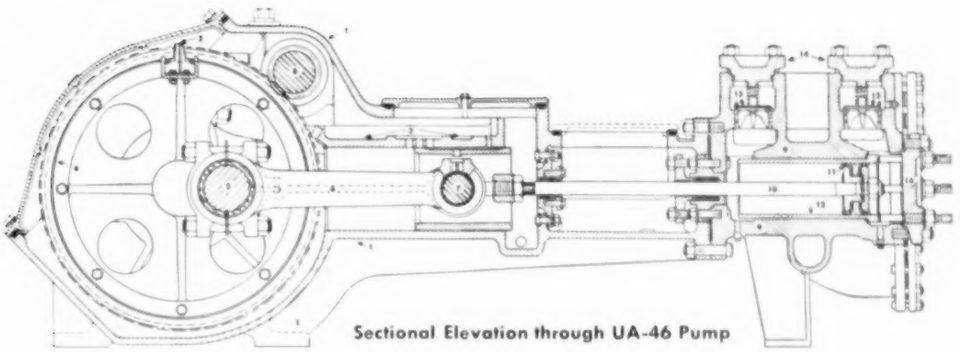
Write for all the facts on Terra-Tires, Rolli-Tankers, Pillow Tanks and Materials Containers to Goodyear International Corporation, Aviation Products Division, Akron 16, Ohio, U.S.A.

GOODYEAR

Terra-Tire, Rolli-Tanker, Pillow Tank—T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio, U.S.A.

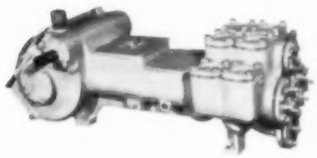
Ever look inside a

Bethlehem Duplex Power Pump?



Sectional Elevation through UA-46 Pump

1) Frame—one piece alloy-iron casting, rib-reinforced
2) Oil Chest—"heart" of the controlled-gravity-flow lubrication system
3) Oil Scraper—collects lubricant from gear rim to supply oil to all parts of power end
4) Main Gear—removable continuous-tooth herringbone
5) Crank Shaft—steel casting, normalized and tempered
6) Connecting Rod—normalized and tempered steel; H-section design
7) Crosshead Pin—alloy steel, hardened and ground
8) Pinion Shaft—heat-treated forged steel with integral pinion gear
9) Fluid-End Casting—moly-iron, steel, or aluminum-bronze
10) Piston Rods—steel, stainless steel, or aluminum-bronze; API taper or straight shank
11) Pistons—chrome-iron snap-ring, composition-cup, or slush type
12) Liners—interchangeable, alloy cast iron, hardened aluminum-bronze, or special order materials
13) Valves and Seats—hardened steel, aluminum-bronze, slush-type, or Nylon disc; interchangeable
14) Valve Covers and Cylinder Heads—moly-iron, steel, or aluminum-bronze



Inside and out, the durability of our U-series pumps is plainly evident. Solidly built for continuous operation at full load, these heavy-duty pumps are designed to give long and economical service in many kinds of applications.

- Waterflooding, disposal, and supply systems
- Mud transfer and general drilling service
- Crude oil pipeline and gathering
- Products, LPG, and oil-processing service

Ask our nearest office or store for complete details. Or write for descriptive literature.

There's a size for every job. Choose between the U-33, UA-46, and U-510

Capacities: 155 to 13,500 BPD
Piston-Rod Loads: 2,400 to 12,000 lb
Pressures: 340 to 1,698 psi

For higher pressures, investigate Bethlehem's Triplex pumps, the TP-3, TP-4, and TP-6

Capacities: 100 to 9,565 BPD
Plunger Loads: 3,580 to 10,000 lb
Pressures: 438 to 3,183 psi

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BETHLEHEM STEEL SUPPLY DIVISION

VENEZUELA

Effects of the Tax Reform

The year 1959 opened up with effects of the income tax revision of 1958 beginning to affect the national economy. Only one month before, on December 18, 1958, the provisional government "(junta) headed by Dr. Edgard Sanabria had published a decree by which the government increased its participation in the industry's earnings from the traditional 50-50 to a 60-40 arrangement. The companies which had received no warning whatsoever, faced a substantial unanticipated debt for 1958 plus having to pay the additional 10% in years to come. They immediately began to cut expenses in their Venezuelan operations.

Thus in the early part of 1959 the national economy, 90% dependent on the oil industry, began to feel the immediate effects. Unemployment rose by 15% private investments were substantially reduced, and the companies hired only personnel strictly necessary.

By the end of the first quarter of 1959, with business at a standstill, unemployment had become a major problem, which prompted the newly-elected government of president Betancourt to call a meeting of the major oil companies in an effort to check mass firings in the industry. Thus the tax increase, which was to increase Venezuela's revenue by some $210 million, had a negative result which was reflected in the sharp reduction of business and subsequent unemployment. The extra amount of money which the government received for 1958 was neutralized by a price reduction announced by the companies in February 1959.

By the end of the first quarter of 1959, (last figure available) oil industry investments had been reduced to US $75 million. In the previous year during the same period the industry spent approximately US $165 million. The US $90 million difference represents a 56% reduction in only three months. The tax reform however, in spite of the negative effects which might have had during its first year, will increase the government's participation in the profits of oil companies which have amounted to $24,595 million since the beginning of the industry in Venezuela some 42 years ago.

Venezuela's 1959 Production Up 5%

Venezuelan government sources estimate the year 1959's production as follows:

PRODUCTION

(thousands of barrels)

January	2,995
February	3,096
March	2,960
April	2,691
May	2,570
June	2,822
July	2,633
August	2,533
September	2,585
October	2,630
November	2,663
December	2,691
Total Year	2,737

1958 production averaged 2,605,000 per day. Thus 1959 shows a production increase of some 132,000 b/d or approximately 5% in spite of the mandatory restrictions. Government estimates for 1960 however, place production at some 2,760,000 bb/d which shows that the increasing production trend will not continue.

Venezuela and U. S. Restrictions

Venezuela has been little affected by the mandatory restrictions imposed on May 9, 1959 by the United States. As a matter of fact, production increased from 2,367,761 b/d average on 1958, to estimated average of 2,600,356 in 1959. The Venezuelan government however, while recognizing the necessity of maintaining an equilibrium of prices and markets, has insisted on a hemispheric quota which it could distribute among the local producers. Oil Minister Dr. J. P. Perez Alfonzo in his May 1959 address to Congress said: "We insist on the need of an hemispheric quota or a special quota for Venezuela which we would distribute among the producing companies in our country. If oil production is balanced by the demand in the various states of the U. S. by the respective government entities, and the same thing is true of Canada, we think it would be appropriate for Venezuela to prorate its own production according to the best interests of our country, and still satisfy the limited demand of the United States or any other country which would want to restrict its oil imports."

Even though the restrictions did not signify any reduction of income, the government felt that the program was somewhat prejudiced against Venezuela, specially after the restrictions were lifted for Mexico and Canada. Speeches made in the floor of congress interpreted the exclusion of Canada and Mexico from the restriction program as a retaliatory measure against Venezuela for having changed the 50-50 agreement a few months earlier.

On May 25, 1959 Venezuela sent a memorandum to the American government with the following considerations: a) The government of Venezuela understands that a mandatory system of import restrictions, such as the one recently established by the US, should have taken into account at least, the preference of the Western Hemisphere for the limited level of imports, in order to maintain a normal market structure in the US for Venezuelan oil.

b) An indiscriminate limitation on the US oil market could result in a loss of markets for Venezuelan oil whose place would be taken by lower priced oil from other countries. The measure could be interpreted as a reprisal, with the purpose of maintaining the excessive earnings of the North American capital invested in Venezuela's oil industry, at a time when Venezuela is trying to adjust its oil income on a more equitable basis.

c) The government of Venezuela thinks that a policy of restrictions of a permanent character may have unfavorable influence on the traditional principles of cooperation of our countries.

d) Venezuelan public opinion has felt preoccupation for the consequences which these measures could have on our national scene, specially because of the inclusion within the plan of petroleum derivatives imported by the US from Venezuela.

e) The system of consultations put into practice from the beginning of the restriction program has been useful in many ways, but in many other aspects, it has not produced a satisfactory agreement on the problems posed concerning the oil industry of the Western Hemisphere.

f) Because of these considerations, the government of Venezuela wishes to insist, to the government of the United States, on the necessity of continuing conversations oriented towards the attainment of a stable market and a guarantee for the prices of Venezuelan oil and other countries of the hemisphere.

Repeated efforts and consultations of the Venezuelan and US governments have failed to bring about Venezuela's exclusion from the program of mandatory restrictions, which remain at present more a matter of national pride than of adverse influence to the oil income of the country.

New Mobil Stations

A Mobil station just completed in Pto. La Cruz is being called the "emblem" station because it uses a protective canopy and other design features as a means of providing strong product identification.

The sweep canopy has the same "broad V" profile that characterizes the bottom portion of Mobil's station identification signs and product labels. Two other elements of the familiar emblem — the silhouetted "Mobil" letters and the flying red horse insignia — are mounted on the canopy to give the whole station the appearance of an enormous sign, yet with an effect of pleasing modern architecture, blending harmoniously with the community. Mobil Oil Co. de Venezuela is counting on the new station design to deepen its market penetration. Mobil's marketers are also offering dealers designs for a larger and a smaller version. All the designs are flexible, being easily adjusted to the particular needs of individual dealers. Several of the emblem stations are now under construction.

Venezuelan Geological Congress

The III Venezuelan Geological Congress will be inaugurated November 22 and closed November 29. Fifty-three papers have been accepted for presentation. Most of the papers deal with surface or subsurface aspects of Venezuelan geology. Among the most interesting contributions are:

D. Renz, *Geology of SE Guajira;* J. B. Miller, *Tectonic elements of the Sierra de Perija and adjacent parts of Colombia and Venezuela;* R. M. Steinforth, *Present Knowledge of trans-Atlantic correlations of the Mio-Oligocene, by Planctonic Foraminifera;* G. R. Pierce, *Geology of the Barinas basin;* R. L. Pérez Mena, *Sedimentation Studies in the Gulf of Venezuela;* A. R. Martinez, *Techniques of Prediction Applied to the Venezuelan oil industry;* H. Alberding, *Distribution of Reefs in Venezuela and Adjacent Regions;* Hoadly, Palombo and Clarke, *Automation Applied to Geological Problems;* M. C. Brenneman, *Chemical Studies of Some Crude Oils from the Bolivar Coastal Field;* H. Bryant, *Use of Neutron Logs in Flowing Wells to Determine the Gas-Oil Contact in the Bolivar Coastal Field;* V. M. Petzall, *Research Work on Tonal Anomalies.*

All papers presented, and their discussion, will be edited in three or four proceedings volumes, scheduled to be ready by next July. All registered members, attending or non-attending, will receive a complete set, included in the registration fees. Fees are Bs. 100.00 (U. S. $30.00).

Information on the Congress could be obtained from Dr. Alirio Bellizia, General Secretary of the Organizing Committee, at Torre Norte Piso 19, Centro Simón Bolivar, Caracas, Venezuela, or from Mr. Anibal R. Martinez, Jersey Production Research Co., 1133 North Lewis Avenue, Tulsa 10, Oklahoma.

Drilling Activities

In the Maracaibo district, Phillips Petroleum has completed semi-exploratory well LPG-12-11, and started drilling LPG-14-18. Initial testing of LPG-12-11 resulted in 4,986 b/d of 34 API oil at a gas oil ratio of 1,395 cu. ft. per bbl. through a 1 inch choke.

Signal started drilling of Centro-22 in the northern part of its concession in the center of the lake, and abandoned Centro-17X and Centro-20 as commercially unproductive.

In the central part of the Nipa area of the Barcelona district, Mene Grande completed as a single producer well Nuca-1 and started drilling of Ida-1 in the Inca field. Initial testing of Nuca-1 resulted in 198 b/d through a ¾ inch choke at a gas oil ratio of 350 cu. ft. per bbl.

Mobil Oil started drilling of the semi-exploratory wells GV-100 in the Guico field and LCV-33R in the La Ceibita field.

In the Aritupano field, Sociedad Anónima Petrolera Las Mercedes started drilling of the semi-exploratory well Oritu-313 and completed as a single producer Oritu-311. This well is producing 410 b/d with a ¼" choke. Gas oil ratio was 290 cu. ft. per bbl., and gravity 24.5° API.

Creole started drilling well PB 276 in Punta Benitez to investigate the Eocene and Paleocene formations. Final depth to be reached will be 11,700 ft. Creole well A-139-1, the deepest well in Lake Maracaibo, was drilled to a final depth of 16,402 ft. At the end of the week electrical logs were being taken.

Richmond started drilling well 28B-1 in the Los Claros field, approximately 15 kms to the west of the Urdaneta field, to investigate production possibilities of the Icotea Basal and higher Boscan sands.

In the Barcelona district, Mene Grande completed Ida-1 as a gas producer in the Inca field. Dry gas was produced with a ¾ inch choke. Pressure was 950 psi. Last week Mene Grande also started drilling semi-exploratory wells OG-465 (in the Oficina field), LM-714 (in the Leona field), and NZ-621 in the Nipa field.

In Barinas, King Mill reached a total depth of 16,037 ft. in well Socopo-2. Electrical logs and core samples are being taken.

In the Maracaibo district the following wells belonging to Superior, Shell, Signal and Phillips respectively, were completed:

Well	Choke	BPD	GOR	Gravity (API)
Lama-28	¾"	1,900	1,210	40.4
VLE-319	½"	1,900	570	24.8
Centro-23	¾"	652	1,450	41.6
LPG-14-12	¾"	6,432	1,220	38.3

The importance of well VLE-319 should be noted since it opens up new production possibilities.

In the Barcelona district no exploratory wells were completed during the week. Mene Grande completed semi-exploratory wells OG-465 and LM-714's in the Oficina and Leona fields, respectively. However, testing results are still unknown.

In the Maturin area the semi-exploratory wells Oritu-313 in the Oritupano field, and Pirital-15 in the Pirital field were completed. However, initial testing results are still unknown. Well Socopo-2 has been abandoned in Barinas, and exploratory activities in the area have been temporarily suspended.

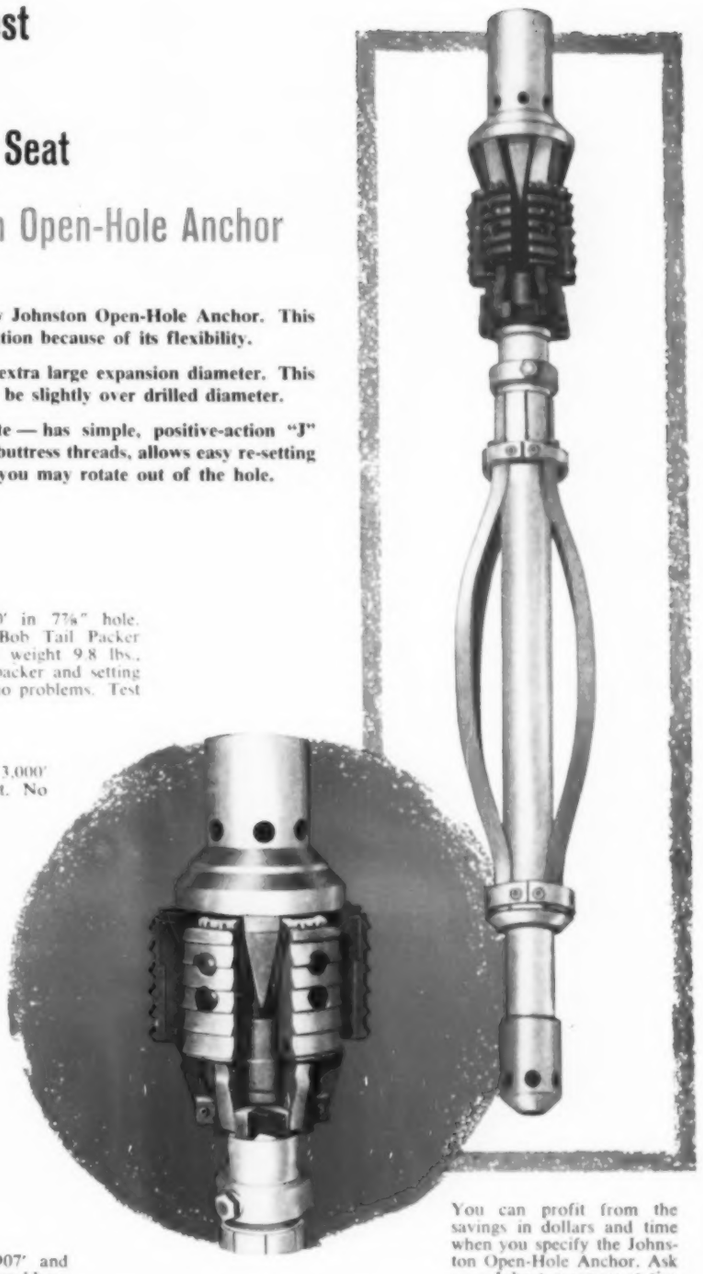
To Open-Hole Straddle Test
Eliminate Tail Pipe
Insure a Good Packer Seat

specify the new Johnston Open-Hole Anchor

Many advantages are offered with this New Johnston Open-Hole Anchor. This is a slip-type device which has wide application because of its flexibility.

The slips are designed and built to give an extra large expansion diameter. This insures seating in wells where the hole may be slightly over drilled diameter.

The Open-Hole Anchor is easy to operate — has simple, positive-action "J" setting. A spring locking nut, incorporating buttress threads, allows easy re-setting of the anchor. When testing is completed, you may rotate out of the hole.



THE PROOF---

Hansford County, Texas
Conventional test at 8800' in 7⅞" hole. Used Anchor and single Bob Tail Packer only. No tail pipe. Mud weight 9.8 lbs., estimated 120,000 lbs. on packer and setting tool. No slipping of tool, no problems. Test successful.

Hansford County, Texas
Straddle test in 7⅞" hole between 3,000' and 4,000'. Anchor set on first attempt. No bypass necessary. Test successful.

Hansford County, Texas
Straddle test in 7⅞" hole between 6,000' and 7,000'. Tool set on first attempt. No bypass necessary. Test successful. Second test run between 5,000' and 6,000'. Packer failed to seat in washed out hole. Moved up hole, tool and packer set on first attempt.

Hansford County, Texas
Straddle test in 7⅞" hole between 5,000' and 6,000'. Tool set on first attempt. No bypass necessary. Test successful.

Liberal, Kansas
Straddle test between 5,006' and 5,016'. Tools worked well. No trouble. No bypass necessary. Test successful.

Liberal, Kansas
Selective zone tests between 3,907' and 3,915' and 4,672' and 4,680'. No problems encountered. Tools worked perfectly. No bypass necessary. Test successful.

Liberal, Kansas
Two straddle tests run between 4,662' and 4,678' and 4,577' and 4,614'. Both tests O.K. No trouble whatsoever. Tools worked as expected. Test successful.

Eliminates the need for tail pipe on conventional tests and straddle tests.

Offers flexibility in finding packer seat. If seat is not obtained on initial attempt just pick up and reset the tool.

You can profit from the savings in dollars and time when you specify the Johnston Open-Hole Anchor. Ask your Johnston representative for full information. You'll be glad you did.

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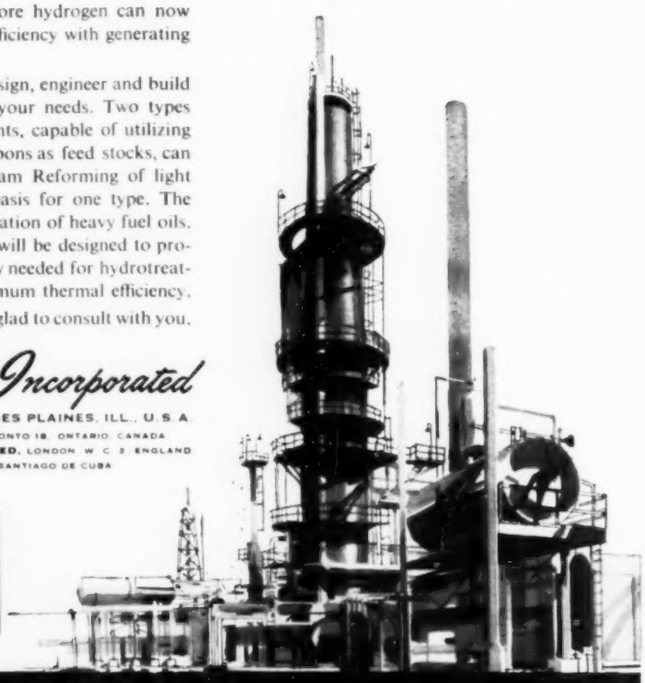

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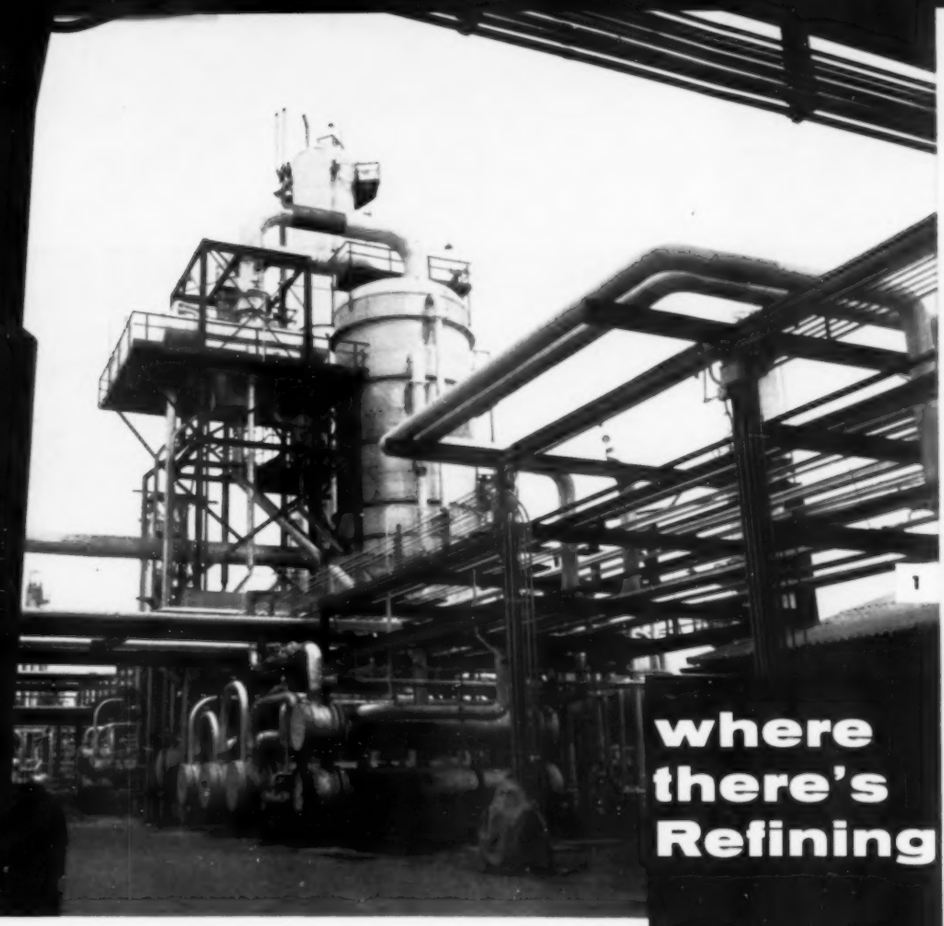

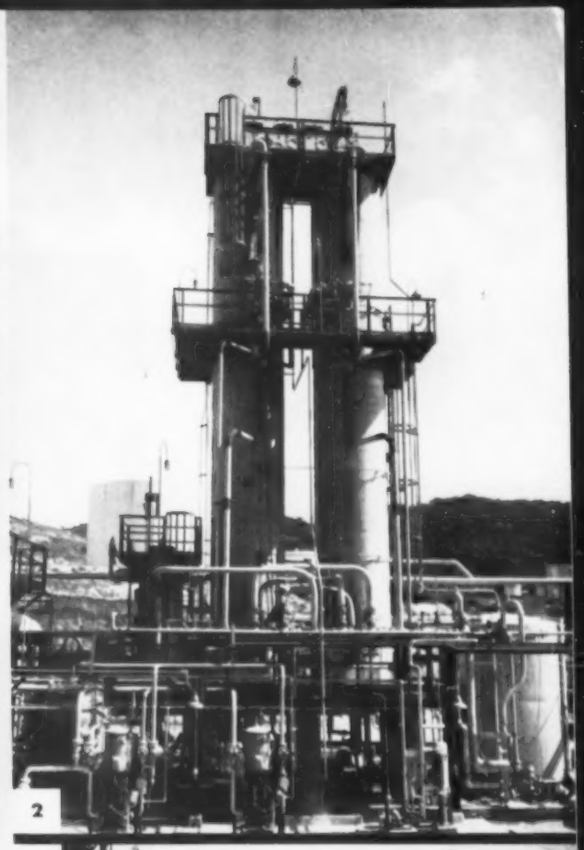

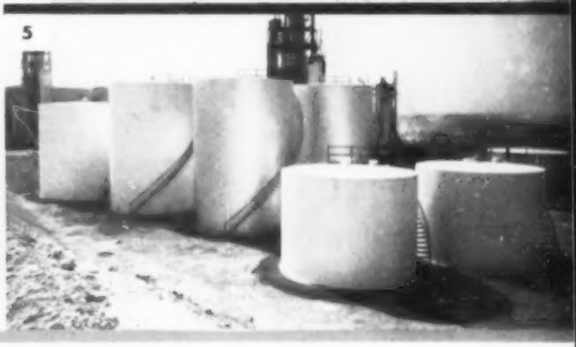

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-there's CB&I

102 CB&I-built structures serve Commonwealth Oil Refining Co. at Ponce, Puerto Rico

CB&I engineered structures, whether for petroleum storage or petroleum processing, are built to serve as "working partners" for one goal—to provide the optimum yield from every barrel of crude.

Nearly 70 years of carefully coordinated engineering, fabrication and erection experience back the *craftsmanship in steel* that has brought CB&I services to world petroleum prominence. And a network of *world representation* places the efficiency of these services at *your* service, anywhere in the world.

For example: CB&I fabricated and erected *102* structures for the Commonwealth Oil Refining Company operation at Ponce, Puerto Rico. Here, CB&I vessels store over 2,300,000 barrels. *Twelve* CB&I-built processing structures, including the reactors, Houdry units and towers shown here, serve as *working partners* to make the most of every barrel processed through this ultra-modern refinery.

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1. **Crude unit**, with crude tower at left and vacuum tower at right.

2. **Hortonclad**® **reactors** are 47-ft. high and built of 316L stainless steel on A212 carbon steel backing.

3. **Fractionating** tower is shown at left, vacuum tower is at right.

CB&I storage vessels handle over 2,300,000 barrels at Commonwealth.

4. **5000-bbl. Capacity Hortonspheres**® are 38 ft. in diameter.

5. **Horton**® cone-roof storage tanks.

6. **Houdry Unit** Catalytic Cracking Unit was fabricated and erected by CB&I.

Structures were furnished through The Lummus Company.

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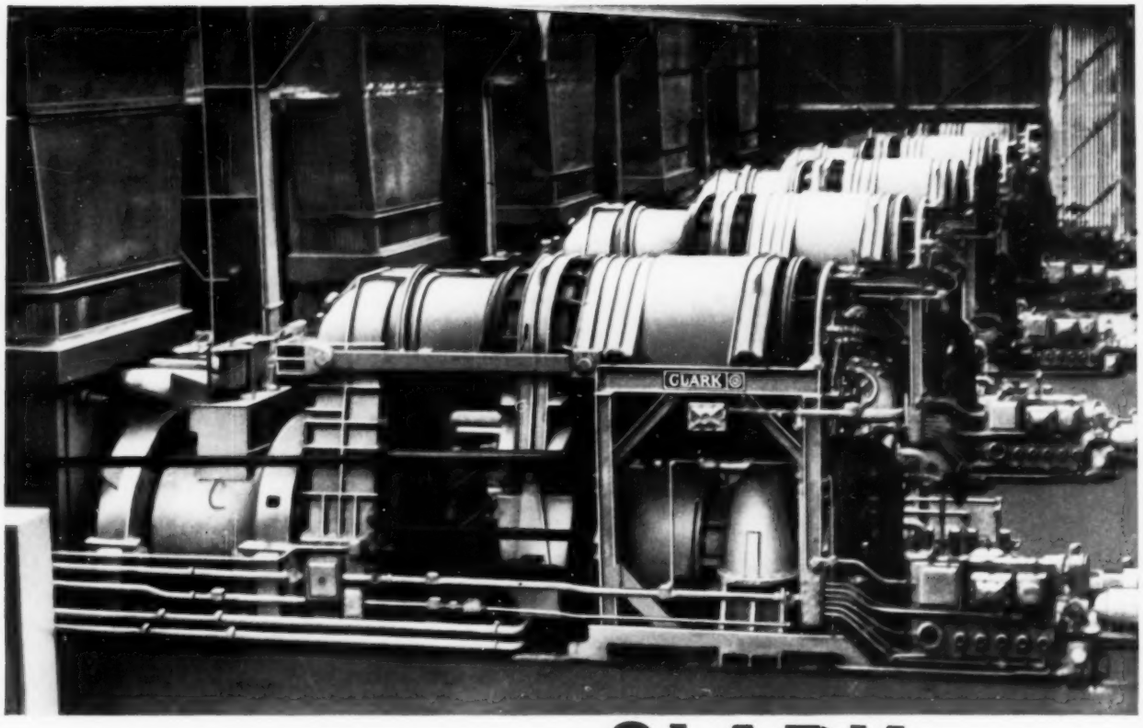
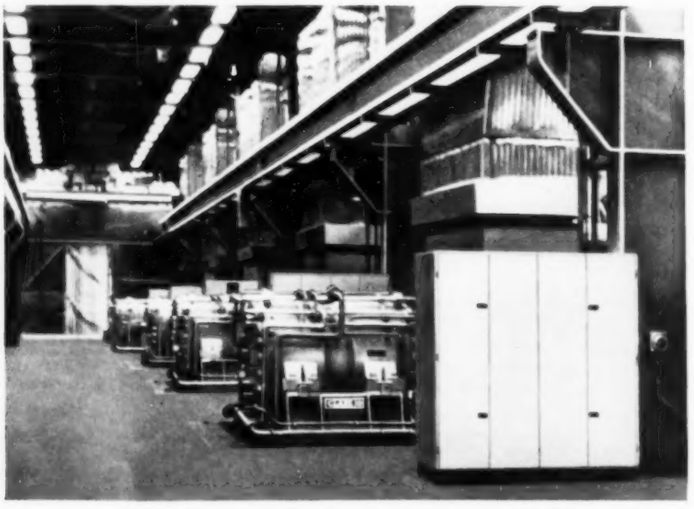


Five Clark Model 305 Gas Turbines drive Clark vertically-split centrifugal compressors operating in series. The station is highly automated with only two operators required per shift.

CLARK Gas 210,000,000



In the Arabian Desert...

At 'Ain Dar, Saudi Arabia, five Clark Model 305 Gas Turbines are driving Clark Vertically-Split Centrifugal Compressors for the gas injection program of the Arabian American Oil Company.

Surrounded on all sides by the torrid Arabian desert, the turbines and compressors are installed in a pressurized building to keep out wind driven sand. Available fuel for the turbines is sour gas while ambient temperatures soar to unusually high levels.

The 'Ain Dar injection plant draws gas from five gas-oil separator plants at a pressure of 125 psig, compressing it to 2100 psig for injection. Any four of the five series connected, turbine-driven Clark compressors can provide the necessary pressure ratio for injection. Maximum flexibility is achieved by the use of dual shaft gas turbines. An additional Model 302 turbine drives a 5600 KW generator to power the gas-oil separator plants.

Turbines Power Aramco SCFD Gas Injection Plant

Proved dependability, minimum maintenance and the low installation costs experienced by other users of Clark gas turbines were important factors in selecting the turbines and compressors for the 'Ain Dar plant.

The fact that some of the Clark turbines and compressors could be delivered from the Olean plant and the balance from Italy, was also of prime importance to Aramco.

Clark 305 and 302 gas turbines have a standard rating of 8700-9300 bhp. 1220 bhp. models are also available. Consult your Clark representative for your next gas turbine or centrifugal compressor project or write for descriptive literature.

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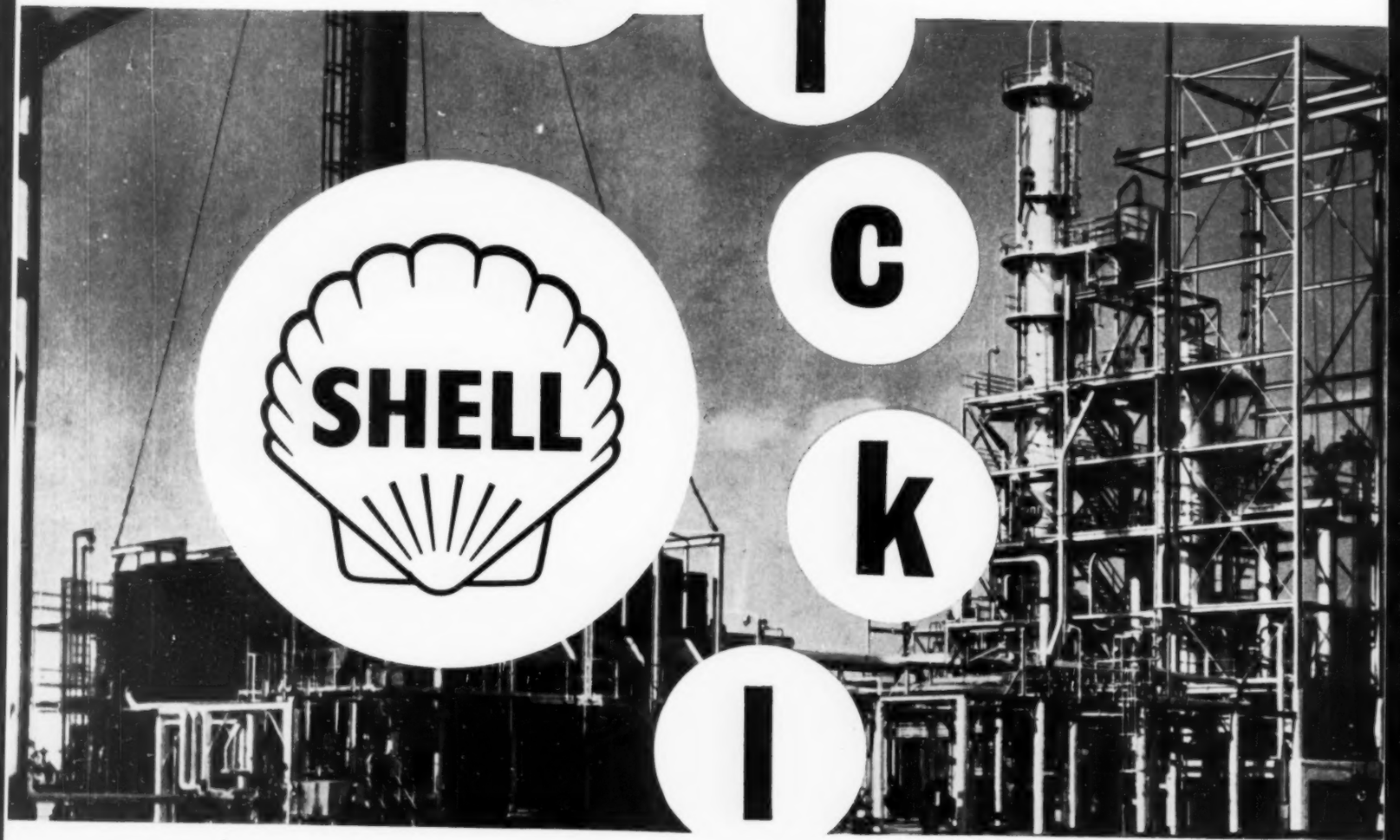
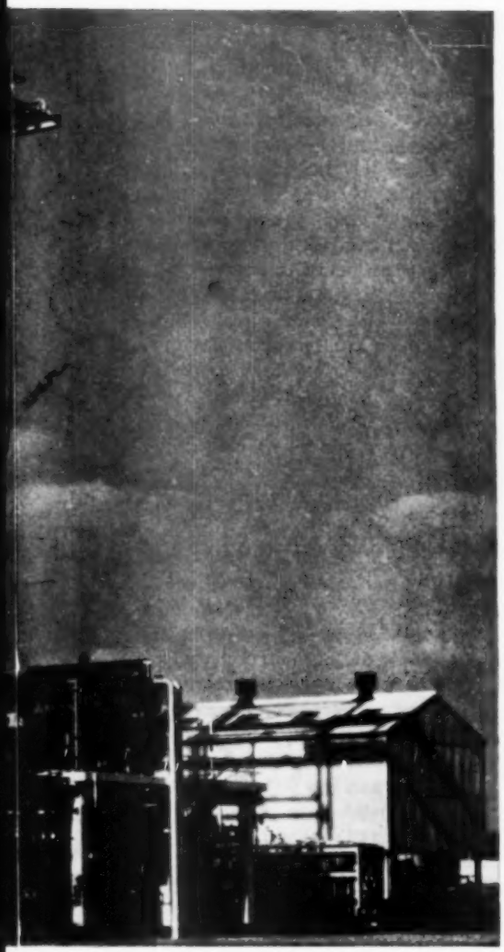


and economy with

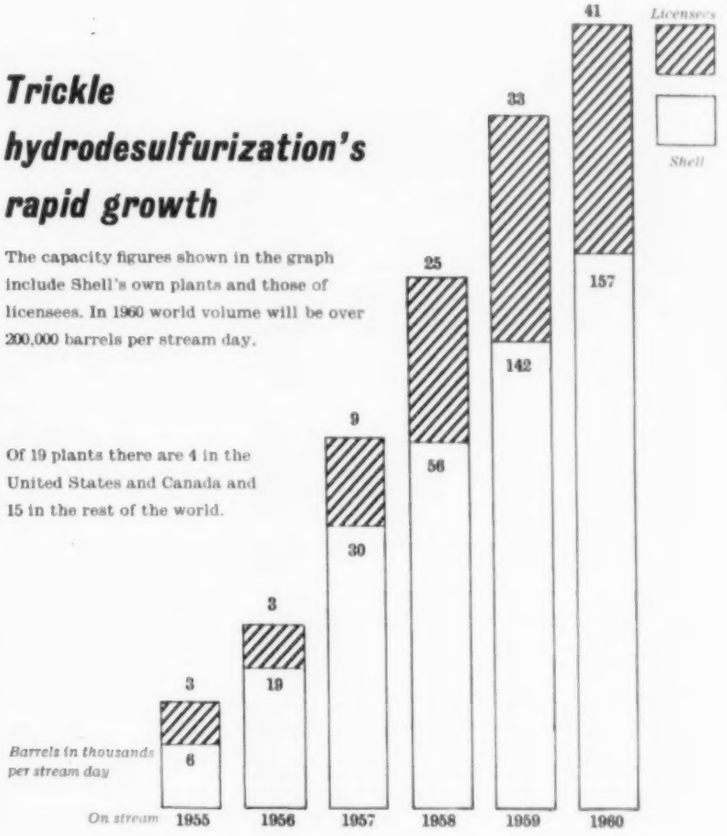
Substantial economies in both capital and operating costs result from relatively low hydrogen recycle rates with only part of the charge vaporized. Sulfur elimination of 85-90% from middle distillates is readily achieved. The process provides notably long runs between infrequent catalyst regenerations to initial activity. Although used commercially for the first time only in 1955, Shell's Trickle Hydrodesulfurization Process is now widely accepted in the industry.

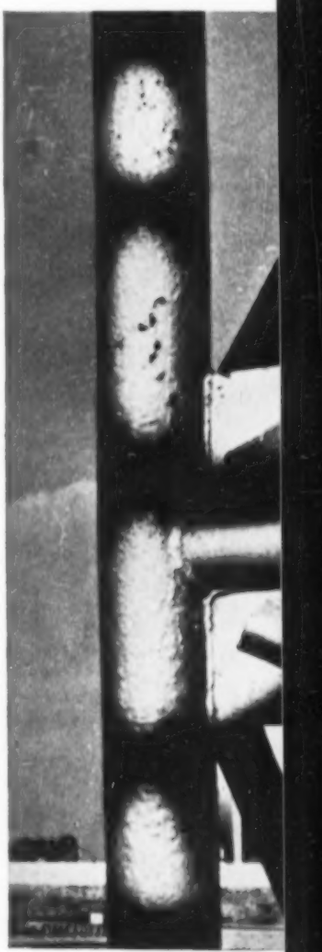


Trickle hydrodesulfurization's rapid growth

The capacity figures shown in the graph include Shell's own plants and those of licensees. In 1960 world volume will be over 200,000 barrels per stream day.

◀ Of 19 plants there are 4 in the United States and Canada and 15 in the rest of the world.





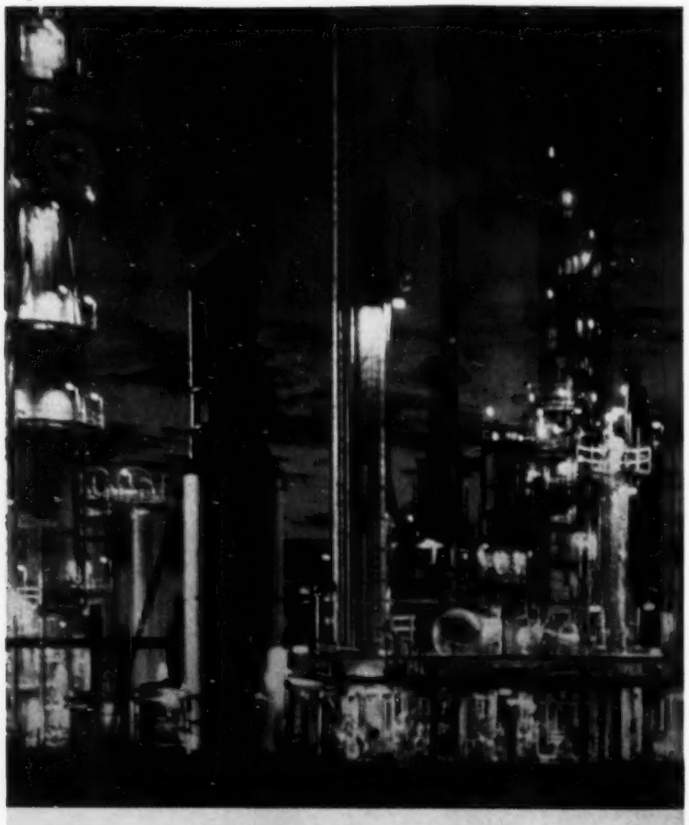
hydrodesulfurization

There is also available a Shell process for the vapor phase hydrodesulfurization of light fractions

Inquiries should be addressed:

For plant locations in U.S. and Canada to: Shell Development Company, 50 West 50th Street, New York 20, New York.

Elsewhere to: Bataafse Internationale Petroleum Maatschappij N.V., 30 Carel van Bylandtlaan, The Hague, The Netherlands (P.O. Box 162).



Nightview of UOP Fluid Catalytic Cracking (left) and "HF" Alkylation units at Leonard's Alma (Mich.) refinery.

UOP Fluid Cat Cracker boosts production of gasoline and quality distillates

Platforming and Udex units produce high quality aromatics for Michigan's petrochemical industries.

Leonard upgrades blending stocks with new UOP Fluid Catalytic Cracking and "HF" Alkylation units

by Reid Brazell
President
Leonard Refineries, Inc.
Alma, Michigan

The question has been asked of me frequently: What has motivated Leonard's growth as one of Michigan's most successful petroleum operations? It has resulted, mainly, from the challenge of the times. Each phase of our development has been chronologically prologued by conditions which have made advancement imperative.

Reid Brazell

Early Improvement Increases Gasoline Yield 130%

Back in the mid-thirties, our chief problem as a newly formed company was to improve octane rating and consumer acceptance of Michigan refined gasoline, known then as the "bargain" gasoline. Low in price, it was also low in grade. Our first step was the installation of a then brand-new refining development, the UOP two-coil selective Thermal Cracking Unit—which enabled us to produce a more competive product and increase our gasoline yield from low-grade crude by 130%!

First "midget" UOP Polymerization unit provided 100-plus octane blending stock

The quality picture further improved immediately thereafter with the addition of one of the world's first "midget" Catalytic

Polymerization units. It went on stream at our Alma refinery and provided 40 BPSD of 100-plus octane blending stock and permitted Leonard to market an 80-octane gasoline.

Post-War Opportunities Foster New Facilities

The end of the war triggered another surge of growth by Leonard. First, a small catalytic cracking unit added another 3,000 BPSD of quality product to our output and this unit was later revamped to up capacity to 7,000 BPSD. An LPG plant was completed, a vacuum unit went on stream, treatment plants were completed and 648,000 barrels of tankage was erected.

Expansion took another giant step in 1955 with Leonard's acquisition of Mid-West Refineries and Roosevelt Oil & Refining Corp. A 1,200 BPSD UOP Udex* unit, tied into Roosevelt's catalytic reformer, increased Leonard's petrochemical business, enabling us to produce quality benzene and toluene for sale as chemical intermediates and solvents.

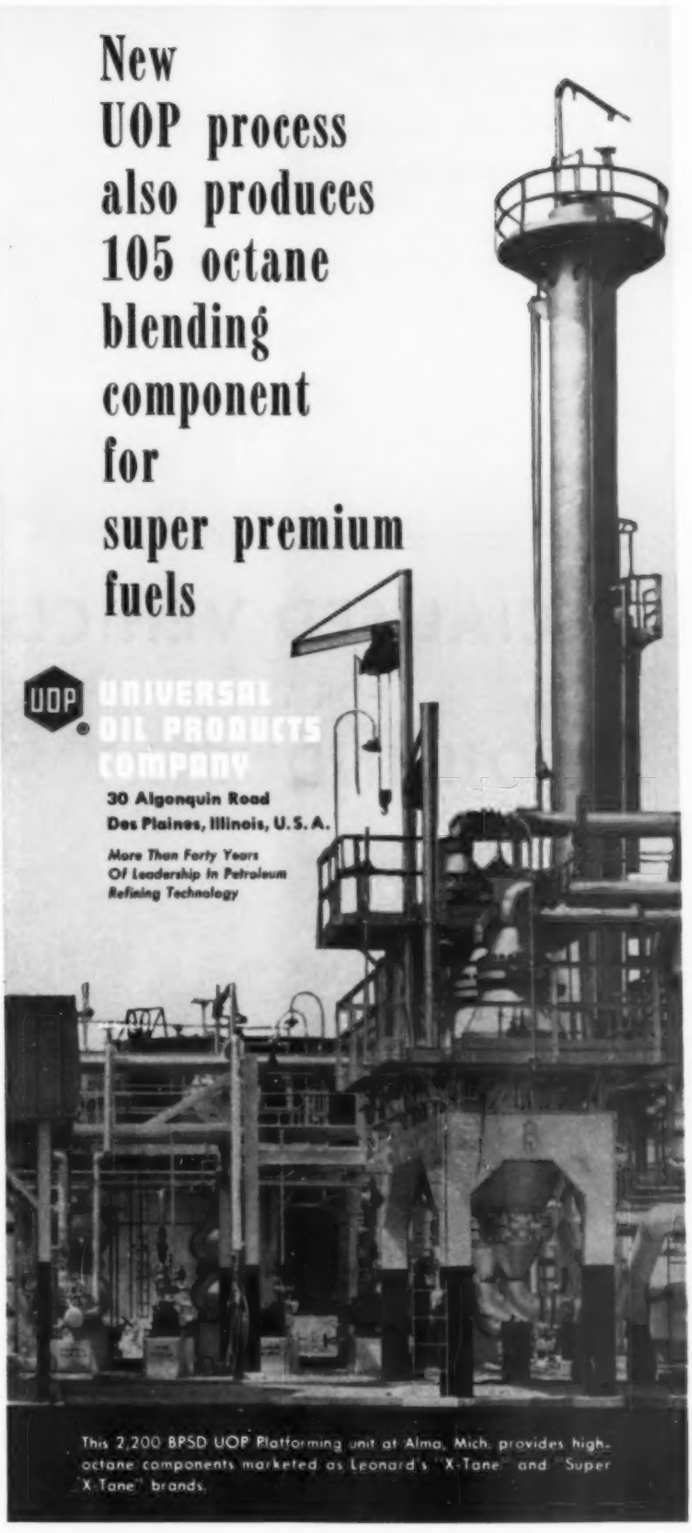
Fluid Catalytic Cracking, and "HF" Alkylation Units Added

Another "changing condition" took place in 1958 when construction of natural gas pipelines into Michigan cut into the demand for residual fuel oils. With our gasoline and domestic heating oil sales up, but industrial fuel oil sales down, we added a 7,500 BPSD UOP Fluid Catalytic Cracking unit to reduce residual stock and produce more gasoline and quality distillates.

Simultaneously, a 1,100 BPSD "HF" Alkylation unit, designed and licensed by Universal, went on stream at our Alma refinery. Producing a 105-octane blending component, the unit made possible a super-premium fuel of more than 100-octane.

Today, Leonard's refineries total nearly 30,000 barrels per day of crude capacity. With a broad range of facilities encompassing UOP Catalytic Cracking, Vacuum Distillation, UOP Platforming*, Thermal Cracking, Udex extraction, "HF" Alkylation, Platreating* and Catalytic Polymerization, we stand ever watchful of "The Conditions of the Times" as a stimulus for future growth.

*Trademark



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Illustrated are examples of medium and heavy duty trucks operating in The Persian Gulf Area and the Argentine.

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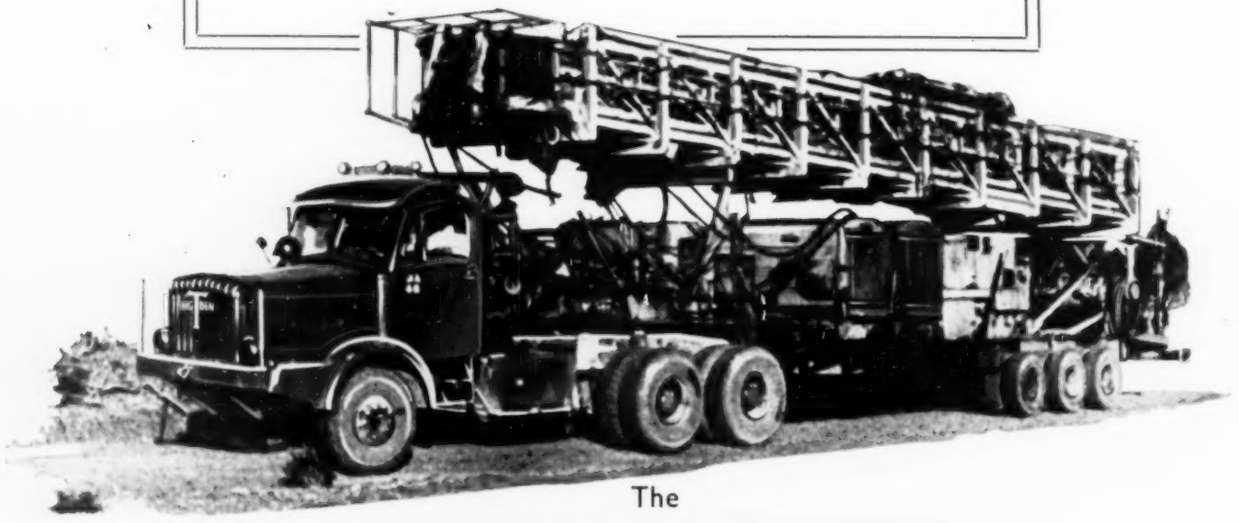

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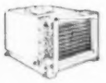

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PRODUCT DEGRADATION from organic acids, arsenic nitrogen bases, gums, lead, sulfur	**ELECTROFINING*** Electric Precipitators	provide an economical method for treating distillates with acid, caustic, doctor and many other treating chemicals—to improve brightness, color stability, facilitate hydrotreating, reduce sulfur and for neutralization.
PRO-OXIDANT COPPER CONTAMINATION	**KUPLEX*** Metal Deactivator	prevents copper and compounds thereof from degrading petroleum distillates. It acts by tying-up dissolved metal as an inactive stable chelate. KUPLEX is effective in gasoline, kerosine, jet fuel, diesel fuel, furnace oil and turbine oil.
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There are two shining examples of good sense and reason in this hemisphere between governments of oil producing countries and oil companies. One occurred recently in Trinidad, where restraint and an impartial analysis operated to calm what was potentially an explosive situation that could have injured both sides. That event is covered in an article in this issue so we need not go into details here. For a second good example, different but also showing mature understanding, we must go to Canada's far north.

Canada's Arctic Islands, Yukon and Northwest Territories are in the midst of what has been described as the world greatest oil play. Oil companies have taken under lease 180 million acres in a most inhospitable region, propelled there by an astute government policy. That policy was outlined in a recent speech by The Honorable Alvin Hamilton, Canada's Minister of Northern Affairs and National Resources. He spoke of Canada's need to develop the oil and gas potential of the North, and said, in part: "We have two basic policy objectives—to protect the public interest and also to encourage development. I would like to elaborate on the second basic policy objective. . . . We are convinced that in the face of a difficult oil market for some years ahead, the key to early northern oil and gas development must lie in producing at the lowest cost possible. If we do not adopt policies to achieve low cost oil, then it appears likely that northern oil cannot be marketed within the next few years. Therefore it is mandatory that we adopt policies to achieve this low cost oil."

He went on to say: "The costs of production . . . will be a vital factor—not only to the investor, who must show a profit, but to the government who wish to encourage development. If the companies do not make profits, then government revenues will be small; if they do make profits, we will share in them."

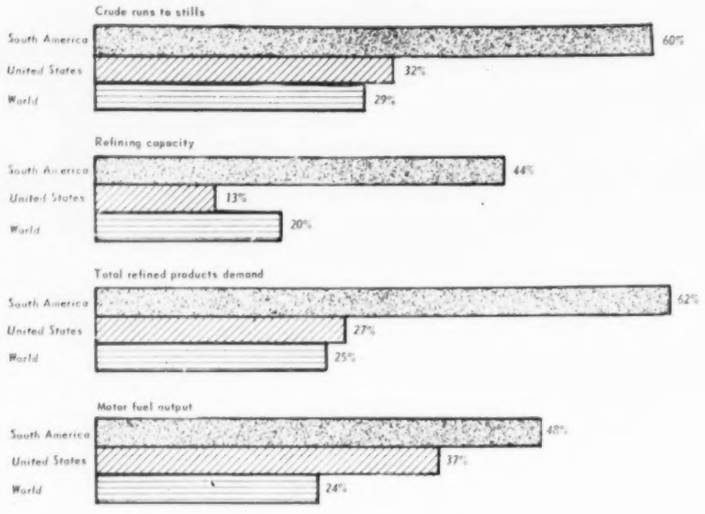
It was the Minister's final words that impressed us most, however, coming as they did from a responsible government official. He went on to outline the liberal regulations which are being formulated to govern the northern oil hunt, and then said "we feel that the early development of northern oil and gas resources is a major key to northern development and of importance to our national economy. We are acutely conscious of the . . . world market problem for oil . . . we know that northern exploration programs will only be pushed vigorously if there seems some good promise of . . . early profits from production. . . . In brief, it is to the interest of both the companies and the government that oil and gas be produced in the north at as low a cost as possible in order that it be competitive. *We are partners in this*" (the italics are ours).

To the editors of World Petroleum, sympathetic as we are to viewpoints of both the host governments and their oil companies, this makes eminently good sense. Oil exploration and development in jungle areas or the far north is equally difficult and expensive. In both cases it must be encouraged and during this time of crude surplus, certain to last for many years, host governments must take into account the need for low cost production if the companies are to compete.

Everyone concerned must look beyond the present situation, however. The world is consuming energy at a growing rate every year, and competent authorities estimate that by 1975, consumption levels will be about double present rates. To supply that enormous quantity of oil is the fundamental challenge to the industry. It means that the oil hunt must continue despite the present surplus, for no oil company can afford to rest on its present reserves without adding to them for the future. A time lag between exploration and final marketing of production is inevitable. Generally about 10 years elapses between a major find and final appearance of large quantities on world markets. For this reason, the oil hunt must continue. Governments must realize that oil companies are doing everything in their power to move crude they hold today, but may not be able to move as much as either side would like. It is the task of dedicated government officials to adjust their oil policies accordingly, allowing for the present surplus but supplying at the same time the incentives necessary to make the oil hunt continue.

Both sides have the same basic objectives; to find oil and to sell it. The Minister's words, "We are partners in this," could well be adopted by other governments as their basic oil philosophy.

South America's five year (1954-59) increase exceeded world and USA . . .



. . . although these factors helped hold down the demand for motor fuels

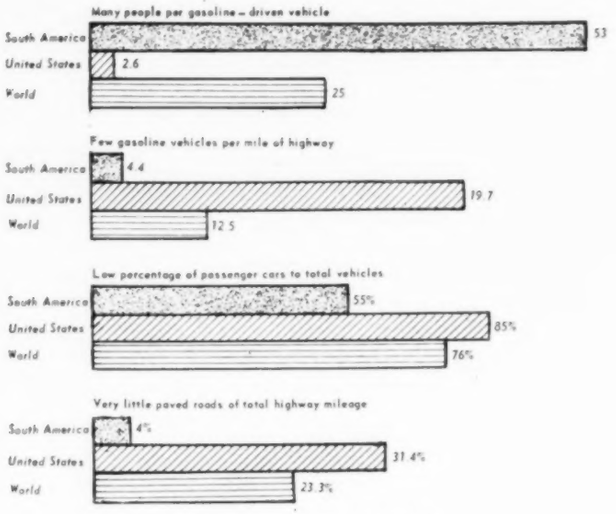


Chart is based on 1958 data. See table 2

South America's refining outlook bright

ON THE SURFACE today's situation in South American refining seems a paradox—growth has been excellent during the past five years in spite of factors which would seem to hold down the demand.

Long range prospects, however, continue bright. Product demand will rise a substantial 40% by 1963, as shown in Table 1, based on a concensus of predictions by industry economists. And in one country—Venezuela—the rise will be considerably greater, 59%.

Refinery construction, both planned and already under way, will keep pace with these anticipated markets, as summarized in the box on the opposite page and in greater detail in Table 3. A comparison of continental South America with the USA and the World is summarized in Table 2.

It will be seen that special refinery processes other than catalytic cracking are only beginning to make themselves evident and, even then, only in a few of the countries, notably Brazil, Chile, Trinidad, Uruguay, and Venezuela.

Several factors will have a significant influence on motor fuel demand and the overall refining situation. These include the following:

(1) Government efforts—and in some cases the beginnings of concrete programs—are under way for economic reform. This "new look" in austerity has started in Argentina, Brazil, Colombia, Peru, and Venezuela.

(2) The refinery expansion and improvement projects demonstrate confidence on the part of both government and private capital, not only in the countries just mentioned above but also in Ecuador, Paraguay, Trinidad, and Uruguay.

(3) A steady growth in road building—probably the key factor in the good prospects for motor fuels—will eventually do much to overcome the current low numbers of vehicles in use.

TABLE 1—INCREASE IN PRODUCT DEMAND 1958-1963

(Data in 1,000 b/d averages)

	1958	Est. 1963	% Increase
Total South America	971	1,360	40
Argentina	275	366	33
Brazil	227	338	49
Venezuela	162	258	59
Other S.A. countries	307	398	33

TABLE 2—HOW SOUTH AMERICA COMPARES WITH USA AND WORLD—1958

(Data in 1,000 b/d averages)

	South America	USA	World
Runs to stills	2,110.0	7,600	15,430
Demand, all products	971.1	9,107	17,550
Demand, motor fuel	219.8	4,012	—
Output, motor fuel	367.3	3,550	5,980
Refining capacity	2,128.2	9,295	19,227
Total vehicles, thous.	2,468.4	68,299	113,024
Population, millions	131.1	172	2,673
Highway miles, thous.	569.7	3,453	9,065
Highway expenditures, est. $ million	609	9,927	17,130
Highway expenditures, $ per capita	4.65	58.00	6.40
Pop. per vehicle	53	2.6	25
Veh. per mile	4.4	19.7	12.5
Passenger cars, % all vehs.	55	85	76
Paved highway, 1,000 miles	22.8	1,085	2,109
Paved miles, % total miles	4	31.4	23.3

(4) There is a beginning of a fair-sized motor vehicle industry and market, one in which local investment capital will share with USA and European manufacturers. For example: Willys Motors reports the following sales growth for commercial "Jeeps" in South America: 1955, 9,961 units; 1957, 32,167 units; 1959, 42,685 units for nine months. In the case of the Brazilian manufacturer—Fabrica Nacional de Motores—output has been doubling each year since 1956 and is expected to reach well over 120,000 units this year. The investment in Brazil's automotive industry will exceed $1 billion next year. Major motor vehicle manufacturers, assemblers, or importers include Ford, International, General Motors, Mercedes-Benz, Volkswagen, and DKW. The Brazilian firm is licensed by Italy's Alfa-Romeo to use its engines.

The years immediately ahead—the short term future—present a picture of considerable problems. Octane levels will not rise rapidly. Except in Venezuela, where a super premium fuel of 95-97 Research octane number is being marketed, gasoline anti-knock ratings will continue to lag. Automobile engines will continue to have lower compression ratios. Passenger cars are still very costly and owners keep them for a long time: it is not uncommon to see cars 15 to 20 years old in good operating condition.

Probably the one overall trend in South America most encouraging to the motor fuel marketers is the road building program.

Highways in South America. Dominating the road systems of continental South America is, of course, the Pan American Highway. Construction and improvements in this system and its connections continue, with some local financing and some loans from such agencies as the World Bank, the U.S. Import-Export Bank and other lending agencies.

Thus far, Latin America has received more highway loans from the World Bank than any other area of the world—a total of some $137 million. Among important

Combination unit at YPF refinery at Lujan de Cuyo (Mendoza), Argentina

Current expansion projects in South America

ARGENTINA

Diadema Argentina SA de Petroleo is expanding its Buenos Aires refinery to 43,000 b/d; to be completed by 1961.

Esso SAPA plans to expand its 25,000 b/d Campana refinery to 60,000 b/d, and add 13,300 b/d to its existing 11,000 b/d Fluid catalytic cracking unit. No completion date has been reported.

YPF is expanding the 95,000 b/d La Plata refinery to 123,000 b/d by 1961. At Lujan de Cuyo, the 23,900 b/d refinery will be increased to 51,900 b/d and a new 16,600 b/d catalytic cracking unit is to be installed by 1961.

BRAZIL

Petrobras is expanding two plants and building two new ones. Mataripe's current 15,000 b/d capacity is to be raised to 37,000 b/d, a new 4,800 b/d catalytic cracking unit is to be installed, and the 200 b/d polymerization unit will be increased to 700 b/d by 1961.

At Cubatao-Sao Paulo, crude capacity is to be raised to 190,000 b/d from the existing 100,000 b/d, and a new $10 million, 12,000 b/d catalytic reforming unit is to be installed, with completion scheduled for mid-1962.

The new Petrobras refineries are: (1) at Rio de Janeiro, a $60 million, 90,000 b/d plant; and (2) at Corumba, a 2,500 b/d plant.

EQUADOR

Anglo Ecuadorian Oil Field Ltd. is spending $4.5 million for a 7,700 b/d expansion in the La Libertad refinery, to bring crude running capacity up to 21,000 b/d by 1961.

PARAGUAY

It has been authoritatively reported that Compaignie Fives-Lille is planning a 10,000 b/d refinery at Asuncion, the country's first.

PERU

Two projects have been reported in the planning stage: (1) an expansion of International Petroleum's 45,000 b/d Talara refinery, and (2) a new plant of undisclosed capacity in southern Peru.

TRINIDAD

Shell Trinidad Ltd. is raising the capacity of its 47,000 b/d Point Fortin refinery to 64,000 b/d by 1961.

Texaco, Inc. has an $18 million, 100,000 b/d expansion project under construction at its 135,000 b/d Point-a-Pierre refinery, including a 15,000 b/d catalytic reformer and 20,000 b/d hydrotreater.

URUGUAY

The country's single refinery, that of ANCAP, is to be doubled in capacity by 1961, to 56,000 b/d. In addition, a new catalytic cracking unit of 5,000 b/d and a 3,000 b/d catalytic reformer are being installed.

VENEZUELA

Like Brazil, Venezuela has two expansions and two new refineries under way. Richmond Exploration Co. is boosting its 50,000 b/d Bajo Grande plant to 53,000 b/d by 1961; and Venezuelan Gulf Refining Co. is doubling the capacity at Puerto la Cruz by 1961, to 120,000 b/d.

Mobil Oil de Venezuela's new $28 million, 50,000 b/d refinery at Puerto Cabello is scheduled for completion by 1961 and will include 5,500 b/d of catalytic reforming capacity. At Cardon, Cia Shell has under construction an 80,000 b/d refinery which will include 2,800 b/d of alkylation capacity.

Table 3-Trends in motor fuels, vehicles, and

ALL OF SOUTH AMERICA[1]

(Data in 1,000 b/d averages)

	1954	1958	Est. 1959	Forecasts 1961	Forecasts 1963
Crude production	2,223.5	3,071.4	3,454.5	—	—
Runs to stills	1,523.9	2,110.0	2,438.9	2,600	2,900
Demand, all products	750.7	971.1	1,220.0	1,220	1,360
Demand, motor fuel	176.0	219.8	232.6	272	310
Output, motor fuel	280.0	367.3	416.0	—	—
Refining capacity	1,583.1	2,128.2	2,281.3	2,817.1	2,962.5
Cat cracking cap.	—	—	226.4	252.8	266.1
Cat reforming cap.	—	—	25.7	49.2	61.2
Poly. cap.	—	—	14.1	14.6	14.6
Hydrogen proc. cap.	—	—	27.0	47.0	47.0
Alkylation cap.	—	—	16.9	19.7	19.7
Total vehicles, thous.	1,971.3	2,468.4			
Population, millions	125.0	131.1	133.8		
Highway miles, thous.	381.1	569.7			
Highway expenditures, $ millions	374.5*	609.0	709.0		
Pop. per vehicle	64	53			
Veh. per mile	5.2	4.4			
Passenger cars % all vehs.	42	55			
Paved miles % all miles	—	4			

[1] Includes entire continent plus Netherlands Antilles and Trinidad
* 1955 expenditures.

ARGENTINA

(Data in 1,000 b/d averages)

	1954	1958	Est. 1959	Forecasts 1961	Forecasts 1963
Crude production	81	98	121	156	167
Runs to stills	153	224.5	215	—	—
Demand, all products	206.5	274.9	280	333	366
Demand, motor fuel	39.8	47.1	46	57	63
Output, motor fuel	39.0	40.0	39.8	—	—
Refining capacity	193.8	243.7	213.6	289.6	329.6
Cat cracking cap.	—	—	18.4	35.0	48.3
R.O.N. premium	—	—	80-85	—	—
R.O.N. regular	—	—	74-80	—	—
Total vehicles, thous.	416.1	603.8			
Population, million	18.1	19.9			
Highway miles, thous.	89.1	91.5			
Highway expenditures, $ millions	62*	75.1	80	**	
Pop. per vehicle	43	33			
Vehicle per mile	4.6	6.6			
Passenger cars, % all vehs.	62	59			
Paved miles, % total miles	—	8.3			

* 1955 expenditure.
** 1960-1965 budget is $231 million.

BRAZIL

(Data in 1,000 b/d averages)

	1954	1958	Est. 1959	Forecasts 1961	Forecasts 1963
Crude production	2.7	52.9	53.1	110	—
Runs to stills	6.5	133.9	138.6	—	—
Demand, all products	163.5	226.5	255	295	338
Demand, motor fuel	59.3	70.1	73.8	91	105
Output, motor fuel	3.0	50.0	51.7	—	—
Refining capacity	11.9	111.8	166.8	281.3	371.3
Cat cracking cap.	—	—	12.5	17.3	17.3
Cat reforming cap.	—	—	—	—	12.0
Poly. cap.	—	—	6.2	6.7	6.7
R.O.N. Prem.	—	—	88-94	—	—
R.O.N. Reg.	—	—	80-87	—	—
Total vehicles, thous.	650	875.6			
Population, millions	54.7	62.5	65.0		
Highway miles, thous.	190.3	326.6			
Highway expenditures, $ millions	65*	200	250		
Pop. per vehicle	84	72			
Veh. per mile	3.4	2.7			
Passenger cars, % all vehs.	52	50			
Paved miles, % all miles	—	0.8			

* 1955 Expenditures.

CHILE

(Data in 1,000 b/d averages)

	1954	1958	Est. 1959	Forecasts 1961	Forecasts 1963
Crude production	4.8	15.3	16.6	—	—
Runs to stills	2.0	22.8	25.6	—	—
Demand, all products	30.4	39.5	52.0	—	—
Demand, motor fuel	8.1	10.4	11.1	—	—
Output, motor fuel	1.0	9.0	10.6	—	—
Refining capacity	0.4	26.7	44.7	44.7	44.7
Cat cracking cap.	—	—	12.0	12.0	12.0
Cat reforming cap.	—	—	6.0	6.0	6.0
Alkylation cap.	—	—	1.0	1.0	1.0
R.O.N. (one grade)	—	—	76-82	—	—
Total vehicles, thous.	86.9	113.2			
Population, millions	5.9	7.0	7.2		
Highway miles, thous.	30.2	33.3			
Highway expenditures, $ millions	12.0*	24.8	30		
Pop. per vehicle	68	63			
Veh. per mile	2.8	3.4			
Passenger cars, % all vehs.	53	48			
Paved miles, % all miles	—	0.4			

* 1955 Expenditure.

developments this year were the following:

Argentina: Prior to the present government, little was being done. Today, the country is preparing to build expressways under a financing system that will not drain the public treasury. Agreements have to be worked out with private syndicates who would be authorized to issue bonds and collect tolls and concessionaire's revenue. Beside rights of way for the system, the government would acquire land along the routes which would be sold to private interests after expressways are completed, returns from which would pay for the construction.

The first such expressway approved is a new 32-mile toll road between Victoria and the port of San Martin, at a cost of $5.34 million.

The national highway budget for 1960-65 is $231 million, calling for 1,620 miles of paved roads and 2170 miles of all-weather roads. A new $22.6 million, 283-mile highway is currently being built by Chaco Province.

Colombia has one of largest, most ambitious programs among the South American countries in its $400 million road building effort which started in 1956 and is scheduled for completion next year. About 6,000 miles of highway will be built or improved. Bogota will be linked with all parts of the country, Cali and the Pacific port of Buenaventura to industrial Medellin and the eastern plains and Venezuela. Fifteen percent of the national budget is now going into roads.

In Brazil by 1962, more than 6,500 miles of new roads will have been built and 2,000 miles of existing roads improved. Eventually, highways will reach to the borders of Bolivia, Peru, Colombia, Venezuela, and British Guiana.

Heart of the program is the building of two major highways to the country's new capital city, Brasilia, to be finished in time for the dedication of the city in April, 1960. One is a 355-mile, paved road between Belo Horizonte and Brasilia, replacing an existing 900-mile zigzag trail at a cost of $36.3 million.

highways in South American countries

COLOMBIA

(Data in 1,000 b/d averages)

	1954	1958	Est. 1959	Forecasts 1961	Forecasts 1963
Crude production	108.7	127.6	141.0	—	—
Runs to stills	92.5	62.8	68.3	—	—
Demand, all products	30.4	39.5	57.0	—	—
Demand, motor fuels	16.8	21.2	24.1	—	—
Output, motor fuel	6.0	17.0	22.7	—	—
Refining capacity	42.6	69.5	70.3	70.3	70.3
Cat. cracking cap.	—	39.0	41.0	41.0	41.0
Poly. cap.	—	—	1.2	1.2	1.2
Alkylation cap.	—	—	2.3	2.3	2.3
R.O.N. Prem.	—	—	95	—	—
R.O.N. Reg.	—	—	83-84	—	—
Total vehicles, thous.	100.6	156.5			
Population, millions	11.3	13.3	13.6		
Highway miles, thous.	10.7	23.4			
Highway expenditures, $ millions	102*	40	50**		
Pop. per vehicle	112	85			
Veh. per mile	9.5	6.8			
Passenger cars, % all vehs.	48	47			
Paved miles, % all miles	—	0.8			

* 1955 Expenditure.
** Total budget for 1956-1960 is $400 million.

PERU

(Data in 1,000 b/d averages)

	1954	1958	Est. 1959	Forecasts 1961	Forecasts 1963
Crude production	47.0	51.3	47.6	—	—
Runs to stills	39.3	41.5	44.0	—	—
Demand, all products	35.4	42.7	51.0	—	—
Demand, motor fuels	11.5	14.9	16.3	—	—
Output, motor fuel	13.0	16.8	13.0	—	—
Refining capacity	47.7	47.7	47.5	47.5	47.5
R.O.N. Prem.	—	—	78*	—	—
R.O.N. Reg.	—	—	67-68	—	—
Total vehicles, thous.	77.2	126.8			
Population, millions	8.7	9.9	10.1		
Highway miles, thous.	22.3	24.8			
Highway expenditures, $ millions	14.0**	6.3	6.5		
Pop. per vehicle	113	78			
Veh. per mile	3.5	5.1			
Passenger cars, % all vehs.	55	54			
Paved miles, % all miles	—	10.3			

* Available only in Lima and Arequipa.
** 1955 Expenditures.

URUGUAY

(Data in 1,000 b/d averages)

	1954	1958	Est. 1959	Forecasts 1961	Forecasts 1963
Crude production	0	0	0	—	—
Runs to stills	23.7	22.8	22.2	—	—
Demand, all products	26.8	28.2	32.0	—	—
Demand, motor fuel	5.5	6.3	6.3	—	—
Output, motor fuel	5.0	6.0	5.8	—	—
Refining capacity	25.2	28.0	28.0	56.0	56.0
Cat. cracking cap.	0	0	0	5.0	5.0
Cat. reforming cap.	0	0	0	3.0	3.0
R.O.N. Prem.	—	—	82-84	—	—
R.O.N. Reg.	—	—	71-74	—	—
Total vehicles, thous.	89.7	147.5			
Population, millions	2.4	2.7			
Highway miles, thous.	6.3	23.9			
Highway expenditures, $ millions	8.5*	12.8	13.0		
Pop. per vehicle	26	18			
Veh. per mile	14	6.2			
Passenger cars, % all vehs.	54	58			
Paved miles, % all miles	—	3.5			

* 1955 Expenditures.

VENEZUELA

(Data in 1,000 b/d averages)

	1954	1958	Est. 1959	Forecasts 1961	Forecasts 1963
Crude production	1,896.3	2,605.8	2,785.0	—	—
Runs to stills	441.3	731.9	810.0	—	—
Demand, all products	107.1	162.0	165.0	220	258
Demand, motor fuel	28.3	39.9	41.4	—	—
Output, motor fuel	63.0	95.0	105.0	—	—
Refining capacity	471.7	791.4	882.7	1,075.7	1,075.7
Cat. cracking cap.	—	—	41.5	41.5	41.5
Cat. reforming cap.	—	—	10.2	15.7	15.7
Poly. cap.	—	—	2.0	2.0	2.0
Hydrogen treat. cap.	—	—	17.0	17.0	17.0
Alkylation cap.	—	—	2.3	5.1	5.1
R.O.N. Super	—	—	95-97	—	—
R.O.N. Prem.	—	—	81-83	—	—
R.O.N. Reg.	—	—	73-75	—	—
Total vehicles, thous.	172.7	321.3			
Population, millions	5.3	6.1	6.3		
Highway miles, thous.	10.7	19.9			
Highway expenditures, $ millions	92.0*	225.5	250.0		
Pop. per vehicle	31	19			
Veh. per mile	16	17			
Passenger cars, % all vehs.	63	66			
Paved miles, % all miles	—	1.9			

* 1955 Expenditures.

The other is a 1,567-mile, all-weather road to connect Brasilia with Belem, at the mouth of the Amazon, and opening up almost 2 million square miles of formerly inaccessible regions in the Amazon basin and the central plateau.

Peru also is trying to reach the Amazon basin. One target is completion of a highway from Olmos, in the north, to a navigable point on the Maranon River, which leads to the Amazon. Another is the central TransAndean Highway, from Callao to Pucallpa, on the Ucayali River, to be converted to an all-weather road throughout its 246 miles at a cost of about $14.8 million.

Ecuador's last remaining incomplete section of the Pan American Highway, from Loja to Macara, is expected to be finished next year as a result of a $4.7 million loan from the U.S. Development Loan Fund. In addition, the country is accelerating other parts of its highway program with a $14.5 million World Bank loan; and work has been initiated on a road between Quelvedo and Santo Domingo.

Venezuela will have spent $175 million by the end of fiscal 1959 on a program calling for building of 923 miles of highways, 200 miles of paving old highways and 150 miles of repairs or relocations.

Visitors to Caracas—and in fact many other large cities in South America—wonder at the automobile statistics when they observe current traffic conditions. In Caracas, authorities have been so concerned with worsening traffic that they have retained the services of Col. H. S. Bingham, president, New York Transit Authority, as a consultant. Bingham has done similar jobs for Sao Paulo, Santiago, Paris, London, and Stockholm.

Data presented in this article have come from a number of sources: oil industry observers, the U.S. Bureau of Mines reports, International Road Federation, U.S. Dept. of Commerce, Automobile Manufacturers' Association, Chase Manhattan Bank, Vision, Inc., various automotive manufacturers, and World Petroleum Report, 1955, 1957, 1958, and 1959. END

Refining bulks large in Trinidad's economic life, and big installations are a prominent part of the landscape as well (Photo courtesy of The Texaco Star).

Trinidad looks up

Government and industry are working together in Trinidad for their mutual good. Legislative reforms, including the 50-50 profits split, are to be introduced without losing vital industry confidence in stability.

WITHIN THE WESTERN HEMISPHERE, no country has shown more orderly and steady growth in its oil industry than Trinidad. Production has increased regularly—the only country in the Western Hemisphere to do so. Now, with announcement of the new $18 million increase in Texaco's refinery there—a good sign that the country is well regarded as an investment site—Trinidad's balanced development is beginning to pay off.

The situation was not always so happy, however. When the big Venezuelan grants were made in 1956 and 1957, Trinidad was a lonely figure on the outside looking in. With bonus payments almost reaching $1 billion for Venezuelan grants—and oil companies paying $100 million for acreage in the Gulf of Paria between Trinidad and Venezuela—friction was arising between the government and the oil companies. Seen now, from the perspective of a few years in which tempers have cooled, it seems a tempest in a teapot but it looked then like a full scale Caribbean hurricane was brewing.

At that moment the government decided to fully explore Trinidad's situation. It called in an outstanding economic consultant from the United States, Walter J. Levy, and to his subsequent report must go much of the credit for calming a potentially bad situation. It is an unusually balanced and reasonable report which has met with both industry and government approval—not always an easy target to hit. Some of its recommendations may cost the companies money, but they are willing to talk if approached in a reasoned manner. The summary of the country's problems and promise which follows is in large part taken from the Levy report.

Trinidad's Strength

Politically mature and stable, an inside track in Sterling markets, well located for export trade—that about defines the elements of strength in her present situation.

Trinidad's oil economy is oriented toward the international oil trade. Crude oil production is slightly over 100,000 b/d; refinery operations, including the processing of imported crudes, yield 135,000 b/d. Local requirements are around 5,000 b/d, bunker sales of 25,000 b/d; and exports to foreign markets in excess of 100,000 b/d.

Thus, Trinidad's oil operations depend on its foreign trade, based in turn on elements of real strength. Trinidad's oil industry is firmly established, its resources base proved, and is backed by large investment in production and refining facilities. Furthermore, Trinidad is a secure source of oil supplies, strategically situated to meet oil demand in both the western hemisphere and western Europe and Africa and, at the same time traditionally conducive to private investment and development. Finally, as one of the few oil exporting countries within the Commonwealth, the availability of Trinidad oil for sterling provides special advantage for bunker and export sales as against "dollar" oil.

And Trinidad's Weaknesses

Most elements of weakness stem from the relatively narrow margin of profitability on local operations. Trinidad's position as an exporting country requires that the value of its crude be related to prices of Venezuelan crudes, the main source of Caribbean oil. Comparison of reserves with crude oil produced, whether number of wells or footage, suggests that capital costs per barrel cannot be as low as in more prolific areas. And the ratio of proved reserves to current production is only on the order of nine years. In Venezuela, it is 16 years' production; (and being rapidly expanded in Lake Maracaibo). In the Middle East established reserves could support current production levels for well over a hundred years. In consequence, Trinidad oil is hard pressed to meet competitive pressures, including large discounts, in world markets during periods of surplus such as at present.

Markets: Europe and West Africa constitute by far the largest market for Trinidad's refined products; and these markets account for the bulk of the increase in exports since 1952. Three major considerations have been conducive to the position of Trinidad products in these markets. First, Europe has had to rely on product imports to supplement its own refinery output, despite major refinery expansion during the postwar period. But additions to European refining capacity so as to provide larger fuel oil yields and thus cut down on Europe's fuel oil gap. Second, pricing of products in Europe on the basis of Caribbean quotations plus freight has permitted Trinidad exports to reach these markets competitively. But here again, continuing refinery expansion and recurring product surpluses have led to price reductions below the level of import parity. As the tie between European product prices and the c.i.f. cost of Caribbean supplies is weakened—moving in the direction of import costs for Persian Gulf crude plus competitive refining margins in the various countries—Trinidad's exports face both a narrowing market and a less advantageous price situation than has been the case up to recently. The expansion of refining facilities in consuming countries of Central and South America and the possible emergence of a common market or free trade area there also

TABLE 1—OPERATING DATA FOR THE TRINIDAD OIL INDUSTRY

(Thousands of Barrels Daily)

	1957
Petroleum Reserves (Millions of Barrels)	300
Crude Oil Supplies	145
Production	93
Imports (a)	52
Crude Oil Requirements	145
Refinery Runs	136
Exports	9
Product Supplies	136
Refinery Output	134
Imports	2
Product Requirements	133
Local Consumption	5
Bunkers	24
Exports	104

(a) Including unfinished oils.

threaten the market potential for Trinidad's product exports.

The channels through which products move to markets, the extensive and diverse market outlets of the international companies are the third, and probably the most significant, consideration affecting Trinidad's product export position. Oil may move through their distribution channels where it might not otherwise be strictly competitive on the basis of price considerations alone. In sum, refining operations in Trinidad play a central role in establishing the export position of its oil.

But trends in crude oil costs and product realization are likely to result in a fluctuating margin on refinery operations. Indeed, periods of product price weakness while crude postings are largely unchanged can actually mean losses in refining. To the extent that Trinidad crude is processed in Trinidad refineries and refining losses may be incurred such losses might reasonably be regarded as a cost of maintaining market position and sustaining domestic production.

The problem is somewhat different, however, in the case of foreign crudes imported by Trinidad refineries. Insofar as such crudes are charged to the refineries at posted fob prices plus normal freight, the processing of imported crudes is also exposed to the impact of world product price fluctuations on the refinery margin; and losses that may be incurred would then be carried as a part of Trinidad oil operations, even though the crude is of foreign origin and the products move to foreign destinations. In the event, Trinidad oil would be subsumming the cost of holding export position not only for indigenous production but for a relatively large volume of foreign production as well. An alternative may be considered whereby the imported crude is supplied and refined products taken by affiliated companies, the Trinidad refinery being paid a processing fee to cover capital and operating costs plus a normal commercial return on investment.

TABLE 2—DISTRIBUTION OF TRINIDAD GOVERNMENT PAYMENTS AND COMPANY PROFITS, 1957

	Thousands B.W.I.$
Company Pre-Tax Earnings	86,160
Payments to Government[a]	44,759
Income Tax	27,667
Royalties[b]	14,060
Customs	1,778
Harbour Dues	504
Miscellaneous	750
Company Net Profits	41,401
Shares:	
Government Take	51.9%
Company Take	48.1%

[a] Excluding payments for various Government services.

[b] In addition, private royalties were B.W.I. $2,357,000.

Source.—Petroleum Technologist's Office.

TABLE 3—TRINIDAD GOVERNMENT OIL REVENUES, 1952-1957

(U. S. Dollars)

	1957	1956	1955	1954	1953	1952
Total Government Revenue ('000)	26,109	19,385	17,732	15,043	14,757	15,309
Total Revenue per Barrel	$ 0.77	0.67	0.71	0.64	0.66	0.72
Total Royalty Income ('000)	8,201	5,966	5,079	4,802	4,090	3,846
Royalty per Barrel	$ 0.24	0.21	0.20	0.20	0.18	0.18
Income Tax Receipts ('000)	16,139	11,451	10,982	8,571	9,085	9,970
Income Tax per Barrel	$ 0.47	0.40	0.44	0.36	0.41	0.47
Production[a] (Thousands of Barrels)	34,062	28,929	24,896	23,629	22,346	21,258
Average Value (As assessed for Royalty)	$ 3.16	2.61	2.47	2.30	2.20	2.13

[a] Includes production on private leases.

Source.—Trinidad and Tobago Petroleum Department, Annual Administration Report.

On the Record

The record of performance during the decade of the 1950's has been quite impressive. Production, crude runs and exports were in a rising trend that compares favorably with that of the Caribbean area. In the last two years especially, Trinidad production advanced 31%, while production in Venezuela in 1958 was only 6% above 1956. Refinery runs advanced 39% while refining operations in Venezuela/NWI were about 1½% below 1956. These advances were reflected in a rising trend of industry wage and salary payments, local disbursements, and contributions to government revenue.

Prospects: This postwar growth has been reshaped by two developments. Exploration in off-shore areas holds out a promise of substantial new reserves and producibility. Projected refinery expansion could consolidate export position in foreign markets. Together, these could pave the way to new growth beyond the bounds that might otherwise have been achieved.

Off-shore successes may be achieved, with new production at least equal to and hopefully much larger than the island's current output, but only after some time and very considerable investment.

Significance of the proposed expansion in refining capacity by the Texas Co. goes well beyond the direct benefits of a major investment program. What is most meaningful, is the conscious decision on the part of the company to base its growing refining and export operations in Trinidad. Instead, increased refining capacity in Trinidad strengthened Trinidad's export position.

Effect of Oil Legislation

The framework of petroleum legislation and tax practice embracing oil operations can act either as a stimulus or deterrent to the oil economy.

A country's petroleum legislation and tax practices are designed: first, to encourage rapid development of resources; and second, to insure maximum government revenues, without impairing incentives for development.

Trinidad legislation is not very exacting compared with modern legislative concepts. Performance obligations are not specified, except for a general requirement of "due diligence" in the case of off-shore exploration, and that requirement would not apply

Expansion of major facilities is one of the healthy signs in Trinidad's oil economy. The plant shown is being expanded by Texaco at Pointe à Pierre (photo from The Texas Star)

Onshore exploration is going forward but expectations are not so good as offshore. Shown is a Shell rig in action at Point Fortin.

"so long as the royalty payments equal or exceed the dead rents." Nor is there any requirement under existing leases for relinquishment of acreage or, after a reasonable time, for developing production. However, Trinidad's annual rentals are not low, and escalate upward during the first six years of a mining lease and during the first ten years of a submarine lease. Thus, for the larger part of a lease's duration, rental payments become a financial liability which a company can in effect minimize either by establishing production as rapidly as possible on promising acreage or by relinquishing unattractive acreage.

The pace of exploration and development has by no means been laggardly, given the maturity of oil operations over the area. The question takes on added importance for off-shore exploration, however. The concessionary areas are in most cases large; exploratory costs are high. A company would reasonably want to pace its activities by balancing out the prospects for the area against costs of exploration and development together with the urgency for production. Meanwhile, dead rents for an entire lease could be covered by royalty payments if substantial production flows are established anywhere within the lease's large compass. Government, on the other hand, would have an interest in the most rapid assessment of the area's potential and subsequent exploitation. Performance commitments as to exploration and exploitation—that would also prove reasonably acceptable from the standpoint of operating companies—might therefore be sought. Similarly, it would seem reasonable to explore the possibility of instituting acreage relinquishment, after adequate time for testing of acreage and taking into account the special problems of off-shore operations. Since, valid leases already cover the bulk of off-shore areas, any changes would have to take cognizance of extant rights and provide for an interim period during which companies would be able to appraise their essential interests.

Major sources of government income from oil operations are royalty payments and income tax receipts. Trinidad royalties range from 10 to 12½% of the value of crude oil produced, the higher rates being applicable only in the case of wells with a daily output far exceeding present production rates in most instances. Trinidad's 10% royalty rate is not high, but in Trinidad, field storage value of crude oil is related by formula to the volumes of products thereof and the level of respective product prices of export cargoes at the U.S. Gulf. In consequence, value added in refining enters into the crude valuation and tends to yield a somewhat higher basis for assessment than if commercial or market values of the crudes were used. Actual royalty payment has apparently ranged between 12 and 13% in recent years. Thus, the effective royalty rate would not seem to be as significantly out of line as the nominal royalty rate might imply.

The field-storage-value formula also tends to subject government royalty income to uncertainties associated with fluctuations in world product prices. In general, it might prove advisable to bring Trinidad's royalty rate more closely in line with modern concessionary practices, and the valuation of crude in line with commercial relationships as determined by competitive force in the Caribbean area of which Trinidad is so intimate a part. For the companies, there would be the advantage of more predictable royalty costs; for government, the advantage would be in a regularization of royalty income.

Tax Rates

Oil companies in Trinidad are subject to the same general income tax as is all business, 40% of taxable profits. In view of the fact that the refining margin is precarious at best and that refining losses on the processing of substantial volumes of foreign crude could subtract seriously from the profitability of operations involving Trinidad oil, a processing-fee arrangement may well provide an important buttress to the government's revenue position.

The importance of refining to Trinidad's export position suggests that it should be carefully considered whether tax arrangements which may be adapted to a 50-50 concept ought to encompass refining—particularly that part of refining which operates on imported crudes—or whether such operations ought to be treated purely as manufacturing and taxed in line with other industries.

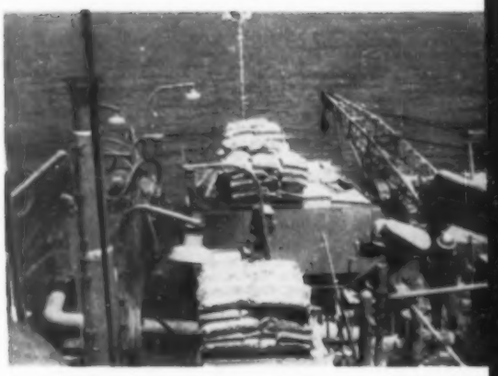
In Trinidad, government revenue has been less, but apparently not significantly different from a 50:50 sharing of industry earnings. Adoption of a 50:50 profit-sharing concept warrants careful consideration. From the standpoint of government, a 50:50 arrangement establishes an assured flow of revenue which is clearly related to the earning capacity of the industry. From the standpoint of the companies, a 50:50 arrangement would provide a predictable basis on which to assess future tax obligations.

If off-shore potential is as good as early indications suggest, then the profitability of oil operations could improve substantially and the existing tax structure may fail to win an equivalent share of oil revenues for the government. Furthermore, the opportunity of taking percentage depletion on income from off-shore operations (at a rate of 20% of the gross value of production by 1966 and through 1982) would seriously subtract from the profits base on which income taxes would be computed. If the 50:50 arrangement commends itself as reasonable to both government and industry, then it would appear that a commitment by government voluntarily to limit its taxing power could be accompanied by an elimination of percentage depletion.

The hope of substantial bonus income largely depends on other areas that may still be available or on acreage that is presently held under submarine license but that may be relinquished in the future. Bonus income and the practice of acreage relinquishment are tied closely together—and involve changes in existing leases that were taken in good faith and on which substantial investment has already been made.

Leasing conditions and fiscal obligations might well be reviewed, in order that they encourage optimum development of the nation's oil resources and insure a maximum contribution to government revenues. Effective updating of Trinidad's oil policies would inevitably imply changes in existing arrangements. But the Trinidad oil industry is too important to the nation's economy and the maintenance of incentives too vital to company operations for company rights to be posed against government prerogatives. It is important to appreciate, therefore, that any changes that may be considered—e.g., payment obligations, acreage relinquishment, a tax situation that is adapted to a 50:50 arrangement without percentage depletion, etc.—involve concessions on the part of both government and industry; and confer mutual advantages on both. In that spirit, changes in Trinidad's legislative and fiscal policies should find acceptance, and thus serve the objectives of optimum development and a fair flow of government revenue, each in balance with the nation's resource position and the economic incentives by which investment and industrial expansion are governed. END

Two views of Richfield Oil's drilling boat "Rincon," which discovered oil on Peru's continental shelf.



Oil's struggle in western Latin America

A review of developments in exploration, drilling, and production as affected by government policies in five west coast countries—Colombia, Ecuador, Bolivia, Peru, Chile

by Dr. J. E. Rassmuss

OIL DEVELOPMENT on the west coast of South America has been strongly affected by government policies. In Peru and Ecuador production and drilling declined in 1958 and 1959 due to unrealistic ceiling prices for the domestic market imposed by the government. In Peru the price ceilings brought complete suspension of drilling by International Petroleum Co. and Cia. Petrolera Lobitos, two companies producing about 90% of the country's output. Drilling was only renewed in August of this year.

New taxation and restrictions in Venezuela and unrealistic demands by Venezuelan oil labor unions brought increasing interest by international companies in Colombia and an oil boom in that country, with production up to about 150,000 b/d.

In Chile, the election of a new independent government improved the economic situation remarkably. The State's oil monopoly, Empresa Nacional del Petroleo, continued its steady progress, raising output in 1958 and 1959, but tendency of the new government to restrict governmental interference and to favor private enterprise offers a more favorable outlook for modifying the oil policy and possible future participation by private capital in oil development.

Peru: In Peru, crude production declined in 1958 by 25% to 51,320 b/d, and continued dropping in 1959 to about 48,500 b/d in July, because of suspension of drilling by International Petroleum Co. and Cia. Petrolera Lobitos, the most important producers of the country, both of them operated by International. By decree of July 2, 1959, the government increased considerably domestic ceiling prices, raising the price for regular 66/67 octane gasoline to nearly 15¢ U.S., at the present exchange rate of 28 soles per dollar, including taxes; doubling the price for premium gasoline 76/77 octane; and tripling the price of industrial kerosine and diesel. The government will shortly submit a law to Congress, submitting the concessions of International Petroleum and Lobitos Co. to the Petroleum Law 11,780 of 1952, which establishes a 50% split of net earnings, but authorizes the international market price for the domestic market.

Drilling was renewed by International in August 1959 with five rigs, and general improvement is expected for the future. Production of Peru in August amounted to 48,640 b/d of crude. Output by International in the first 6 months of 1959 was 4,123,587 bbls from Brea-Pariñas field and 3,692,892 bbls from Lobitos fields. In addition, 414,026 bbls of condensate were recovered in Brea-Pariñas and 112,937 bbls of casing head gasoline from the Lobitos fields. Total crude output of Peru for the first half of 1959 amounts to around 8,730,000 bbls, a decline of about 7% against the preceding years' average.

Empresa Petrolera Fiscal's output, almost entirely from its Organos field (Zorritos being completely depleted) declined slightly in first half 1959 to 430,915 bbls total, or nearly 2,400 b/d. Drilling was carried down to the lower sands of the oil-bearing Talara formation, the Nuro and Patria section. Total production in 1958 was 911,900 bbls. About 160 to 170 wells are currently producing.

Peruvian Pacific Petroleum Co., subsidiary of Cities Service and Richfield Oil Corp., produced in the first six months of 1959 a total of 14,616 bbls, or around 80 b/d, from the two producing wells in its concession east of the Lobitos fields, where shoreline facies of the Tertiary formation predominate. Production declined from a total of 56,613 bbls last year.

In the latter part of 1958, Peruvian Pacific extended its operations to the continental shelf. It acquired the rights of Douglas Oil Co., which had withdrawn, took about 92,000 acres additional concessions on the shelf, and brought Richfield's 600-ton drilling boat Rincon from California for drilling in deeper waters. The first well, about 2½ miles offshore from Lobitos in 150 ft of water, yielded only gas shows and was abandoned at 5,662 ft. The second well, about 3 miles offshore Punta Lobitos, in 216 ft of water, found oil sands in the Lower Eocene Pariñas formation from 2,802 to 2,996 ft and on test flowed 416 b/d of 38° API crude through a ¼ in. choke. The third well, about 2½ miles farther north, yielded about 200 b/d. A fourth well, drilled offshore from Cabo Blanco to the north, yielded 360 b/d at 920 ft depth and around 200 b/d additional at about 1,400 ft. A fifth well was recently drilled offshore from Lobitos to about 6,363 ft, but was dry. All wells have been closed and drilling temporarily suspended. The commercial importance of these discoveries and their economic development is questionable due to the heavy cost of offshore drilling and operation.

Petrolera Peruana, the national company which drilled 12 wells in its Mirador concession south of the Chira river, bordering International to the south, and got 11 producers, sold its entire holdings, including offshore concessions from Talara and about 500,000 acres in eastern Peru, to Belco Petroleum Corp. of New York. Petrolera had an output of 114,456 bbls total in 1958 and 45,653 bbls in the first half of 1959 or about 250 b/d. Belco

Petroleum is shipping two rigs from Venezuela and had planned to start drilling in November, employing one rig for directional drilling on the shelf.

Petrolera Amotape continued successfully drilling in its concession on the northern coast, adjoining the Lobitos concessions to the north. Well C 12 in the Carpitas area yielded about 400 b/d from the Upper Eocene Verdun sands at 2,300 ft after sand fracturing, and C 14 from the same sand produced 354 b/d. C 13, completed at the end of September, yielded about 200 b/d. Total output for September amounted to 8,820 bbls from six producing wells. The company, which so far has only tested the Upper Eocene sands, proposes to extend drilling to the Middle Eocene Talara and Lower Eocene Salinas formation, which offer prospects for a considerably higher output.

In the Amazon basin of eastern Peru the German syndicate of Deutsche Erdoel, Wintershall and Elwerath are associated with the national El Oriente Co. They completed in the Maquia field, at the end of 1958 and beginning of 1959, wells 8 and 9, about 2,150 ft deep, which produce 300 b/d each. Well 10 yields about 150 b/d. Drilling was suspended after building a 4-mile pipeline to the Ucayali river and storage tanks at the river port, Puerto Oriente, and acquiring two 8,000-bbl barges for river transport to Manaos, Brazil. Commercial production at around 20,000 bbls monthly or about 700 b/d is foreseen before the end of the year.

About 11 miles southwest on a smaller closure of the structure, the wildcat Pacaya was drilled to 4,528 ft depth, but yielded only shows of oil and was abandoned. Investment by the German companies so far has been estimated at about $5 million.

Ganso Azul, which last year had to reduce operations because of damage to two river barges, increased its output recently, operating 11 to 15 wells. Production for the first six months of 1959 amounted to 398,480 bbls or around 2,200 b/d. In August it amounted to 75,779 bbls, shipped to the government refinery in Iquitos and to the Manaos refinery in Brazil.

Texas Petroleum Co., after drilling a dry wildcat to 7,591 ft depth in Yurimaguas, abandoned its Yurimaguas concessions and about 2 million acres in the Marañon area, and in June 1959 ceased its operations in Peru after an expenditure of 116 million soles (about $5 million). The company still retains around two million acres of concessions in eastern Peru.

15 other companies retain nearly 30 million acres in eastern Peru. Cerro de Pasco Petroleum Corp. has been one of the most active, completing seismic surveys of the most promising areas, which indicated five prospective geological structures. The company proposes to start drilling in 1960. No drilling has been carried out during 1959 in the Peruvian Amazon basin, and activity has been restricted to geological and geophysical surveys.

Domestic consumption in Peru amounted in 1959 to about 41,600 b/d, over 80% of national production. The new price structure provides a sound basis for the oil industry. Outlook for an increase of production in the coastal area is favorable due to considerable reserves of the Lobitos fields, attractive prospects in the adjoining Amotape area, and increasing interest in development on the continental shelf. Peru, with its free economy and free exchange, may soon attract new international capital.

The 45,000 b/d refinery at Talara of International Petroleum Co. supplied about 98% of the domestic market, and is being expanded. Runs to stills amounted in 1958 to 15,161,247 bbls. Exports by International amounted to 3,063,507 bbls of products, of which 2,062,555 bbls were exported to Chile, 266,373 bbls to Ecuador and 237,885 bbls to New Zealand. Another refinery in southern Peru has been proposed.

Bolivia: The first trans-Andean pipeline in South America, connecting the Bolivian field of Camiri in the foothills east of the Andes with the free port of Arica in northern Chile, a total length of nearly 800 miles and crossing the Andes at an altitude of 14,000 ft, was completed in March 1959. The last section from Sica-Sica on the Cochabamba-La Paz line, a length of 218 miles, to Arica has been completed by Williams Brothers in about one year at a cost of $12 million.

Production in Bolivia declined, however, from 9,796 b/d in 1957 to an average of 9,413 b/d or 3,435,830 bbls total in 1958. In 1959 output of Yacimientos Petroliferos Fiscales Bolivianos, which so far remains the only producer, rose from a low of 7,590 b/d in January to 8,900 b/d in May, 1959. The Camiri and neighboring Guaray field remained the principal producer with an average of 8,175 b/d in 1958. At the end of the year 89 wells were producing, of which 72 were flowing and 17 pumping. Average yield per well amounted therefore to around 90 b/d. Output of the Bermejo-Toro field, on the southern frontier with Argentina, remained more or less stable, yielding in 1958 an average of 1,144 b/d. At the end of the year 16 wells were flowing and 10 pumping. Three exploration wells on the Arrozales and Barredera dome of the same structure remained dry. The small Sanandita field yielded only 94 b/d from 12 pumping wells and two new wells remained dry. Besides 14 new producers in Camiri, two wells in Camatindi and one in Buena Vista were producers. YPFB has planned to raise its output in five years to 35,000 b/d, including 25,000 b/d for export, but its difficult financial situation, augmented by the first strike in many years of its labor union, has held down activity.

International companies, which now hold about 30 million acres of concessions, have been active, notwithstanding political and economical unrest. Gulf Oil Co. of Bolivia completed two wells in Mandeyapecua on the border of the Chaco to 11,623 ft and 6,500 ft depth, which were abandoned. A wildcat at Yoay in Santa Cruz was drilling below 15,000 ft at the end of August 1959. Two other rigs are drilling.

Chaco Petroleum Co. of Tennessee Gas and associates in the former McCarthy concession drilled a new well on the Monos anticline, where McCarthy had proved noncommercial oil and gas. The first well on the Agua Salada structure (the Argentine Campo Duran structure), was drilled to 9,532 ft depth and abandoned. The second well, Agua Salada 2, was drilling at around 12,000 ft depth at the end of August.

Fish Engineering Co., which bid $1.5 million cash and a 50% royalty on oil and gas in the Bolivian "Madrejones" concession on the Argentine border, spudded two wells using Big Chief Drilling Co. of Oklahoma. They were at around 12,000 ft and 10,000 ft at the end of August, 1959.

Other international companies, which include Bolivian Shell, Bolivian California (subsidiary of Standard California), Sun Oil Andes Oil (formed by Pure Oil, Hancock and Sohio), White Eagle International, Bolivian American (affiliate of Cuban Consolidated), Bolivian Petroleum Corp. (affiliate of Drilling and Exploration Co. and Atlantic Refining), and Cataract Oil Co., began surface exploration by aerial, geological and geophysical surveys, operating around 30 crews.

10 rotary rigs of YPFB were active at the end of 1958 and 33 wells were completed, of which 24 yielded oil.

The political and economic situation of Bolivia remains extremely critical. The exchange rate rose to 11,000 per dollar. Labor struggle, strikes and revolutionary movements undermined the stabilization effort. And the leader of the extremely left Central Obrera, Juan Lechin, has been proposed as candidate for vice president in the next elections. The Soviet Union has reportedly offered a credit of 60 million dollars, acceptance of which has been recommended by the Central Obrera.

Chile: In Chile, the general situation improved remarkably after the election of the new independent government. After long years of increasing inflation the exchange rate has been stabilized, and a new currency will be introduced, beginning next year. The value will be almost equal to the dollar. Credits in a total amount of $280 million have been granted to the new government by the United States, Western Germany and France for reorganizing the finances and the economy on the basis of free enterprise and for developing the resources of the country.

Oil development by Empresa Nacional del Petroleo, the autonomous government agency, continued its steady progress. Production from the Lower Cretaceous Spring Hill sands at about 7,000 ft depth, increased in 1958 by more than 28% to 15,253 b/d., and went up again in the first half of 1959 to about 17,247 b/d, nearly 10% above the preceding year's average. Output in August was about 560,400 bbls. The highest output so far was in August 23, 1959 with 19,300 b/d. Cumulative output of the Magellan fields exceeds 25 million bbls.

Total output for 1959 is estimated at 6.3 million bbls.

Biggest share was supplied by the Cullen pool with around 1.25 million bbls in the first 6 months of 1959, or more than 30% of the total. Cumulative production of the Cullen pool is nearly 6 million bbls. Second was the Sombrero pool with (about 523,000 bbls) in the same period of 1959. Victoria Sur, located in the western part of the fields, yielded about 245,000 bbls. Tres Lagos in the south, discovered in 1957, yielded about 160,000 bbls, and Gaviota, the most southern extension on the NW-SE striking structure, yielded around 35,000 bbls in the first half of 1959. Punta Delgada and Delgada Este, the northern extension, discovered on the continent on the northern side of the Magellan Strait, increased from 880 bbls total in 1958 to around 12,600 bbls in the first half of 1959.

In 1958, 74 wells were completed, of which 28 yielded oil, 10 gas and 36 remained dry. Total wells completed in the Magellan fields to July 31, 1959, were 469, of which 176 yielded oil, 76 gas and 215 were dry. 130 of these wells were drilled for exploration and 17 of them yielded oil, 21 gas and 92 remained dry, representing a success rate, including gas wells, of nearly 30%.

At the end of 1958 a total of 101 wells were in production, of which 93 were flowing and 8 pumping. Exploration, which last year found oil on the mainland opposite Tierra del Fuego, has been extended to northern Chile; the province of Tarapaca, where (principally at Pedernales in the Puna de Atacama) significant oil seepages occur, related probably to Mesozoic deposits, neighboring granite and volcanics. Geological surveys have been activated, an airborne magnetometer survey carried out, and seismic surveys started in the region north of Iquique. A proposition by the mining committee in Congress to admit participation of foreign capital for the oil exploration in northern Chile, was overruled by the Congress.

The aim of Chile's oil policy and purpose of Empresa Nacional to make the country independent of foreign imports has been achieved in a large proportion. While in 1956 domestic supply for the 20,000 b/d national refinery at Concon attained only 45%, it increased in 1958 to 68%, representing a saving of nearly $20 million in foreign exchange. The balance was imported from Venezuela. About 90% of the domestic demand of gasoline and diesel oil has been supplied by the national refinery. About 8 million bbls or 22,000 b/d of crude were processed in 1958. The doubling of the capacity of the Concon refinery to 44,000 b/d capacity, being carried out by M. W. Kellogg Co. and scheduled to be completed by the end of the year, will present new problems for its supply of crude.

Colombia: In Colombia crude output increased only 2.5% slightly in 1958 to 128,492 b/d, but raised rapidly in 1959, reaching 155,755 b/d in August.

Oil Production of Colombia—1959
(Barrels Daily)

January	138,052
February	138,247
March	140,031
April	146,785
May	137,307
June	147,311
July	137,823
August	155,755

Biggest producer is now Colombian Petroleum Co., with nearly 50,000 b/d on August 1959, due to development of its Cicuco field in the Caribbean area. That field reached about 20,000 b/d, and was connected by a pipeline with the main line to Coveñas on the Caribbean coast. Texas Petroleum Co. averaged around 40,000 b/d in 1959—40,635 b/d in August—from its Velasquez and Palagua fields in the upper part of the Magdalena valley with a small addition from the neighboring Ermitaño field and including about 1,200 b/d from its Tetuan field in the upper Magdalena. Shell, in former years the biggest producer, averaged 37,000 b/d in 1959, declining at Casabe but increasing the Yarigui field. Empresa Colombiana de Petroleo's output from the De Mares concession amounted to around 27,000 b/d, having already yielded a cumulative output of nearly 500 million bbls. Nueva Granada, the new subsidiary of United Fruit Co., produced 241 b/d in August from the Lebrija field. International Petroleum Co. produced only 126 b/d from its lower Magdalena fields.

As of June 30, 1959, a total 2,061 wells were producing in Colombia, of which 184 were flowing, 1,852 pumping and 25 gas-lift. More than half of this number corresponded to Empresa's De Mares fields with 1,110 pumping and 21 flowing wells.

At the beginning of September, 16 wildcat rigs were active, more than in Venezuela, two by Empresa, three by Texas, two by Colombian Petroleum, one by Shell, two by International, one by Cities Service, one by Nueva Granada, one by Sun Oil, two by John Mecom of Houston and one by Mobil Oil. In addition, 10 field rigs were operating, four of them for Texas.

Oil operators number 17 now in Colombia, which includes besides Empresa, Shell, Texas, Colombian Petroleum, International, Richmond, Mobil Oil, Cities Service and Forrest Oil Corp., the newcomers—Sun Oil of Colombia, Amkirk Petroleum Co. of Fort Worth, John Mecom of Houston, Sinclair Colombian Oil Co., Intercontinental Petroleum, formerly Michael Benedum of Pittsburgh, who first entered the country to operate the De Mares concession more than 30 years ago, Panoil of Dallas and Humphrey of Houston. Exploration activity is therefore intense.

On the Tertiary Pacific coastal belt, where in former years Richmond drilled its dry wildcat in the Choco department in the north, 15,539 ft deep, and Mobil's wildcat Chagui near Tumaco, was dry at 13,107 ft, Intercontinental Petroleum Co. has taken about 5 million acres under concession.

On the Caribbean coast, John Mecom is drilling at Tolu jointly with Empresa on a 75-25% basis, and also in the Chinu area, south of Coveñas terminal. Sinclair Colombian Oil Co. is drilling on the Santa Rita farmout. Amkirk Petroleum abandoned a non-commercial well in the Sinu area—Morocco at 4,828 ft and spudded a new wildcat on the Caribbean coast between Baranquilla and Puerto Colombia. Sun Oil of Colombia drilled two dry wildcats in the Sinu basin and located a new wildcat on the Gulf of Uraba, the most western portion of the Caribbean coast.

In the middle Magdalena valley Benedum will start drilling in 4 new concessions, granted to Empresa. Empresa itself drilled an exploration well, Lisama 4, to 15,090 ft. International Petroleum and Sun Oil are drilling in the Provincia block. Cities Service continues drilling in the Santa Clara area, where No. 1 yielded about 400 b/d of heavy crude. Texas spudded well 4 in its Sogamoso field, which yielded a total of around 60,000 bbls in 1958.

Most important is start of exploratory drilling in the Llanos region, the big prospective area east of the Andes, where several stratigraphic tests were drilled last year by International and Mobil Oil.

Mobil Oil jointly with Shell spudded a wildcat in the northern Llanos, south of the Barinas basin of Venezuela, and about 600 miles from the coast, at La Heliera. Cost of the well including previous seismic and gravimetric surveys, transport and location is reported at about $3.5 million. Depth, at the beginning of September was over 8,000 ft.

On a promising broad structure, 65 miles east of Bogota, Texas Petroleum Co. located its wildcat Guavio 1. Transport of rig and material had to be carried out by air, and heavy rains have delayed drilling.

Summarizing the results of recent exploratory drilling in Colombia, the principal discovery has remained the Cicuco field, opened in 1956, where 16 wells have been drilled so far, yielding from the Cretaceous limestone more than 1,000 b/d average per well of high grade crude. Because of the big gas potential also building of a gas line to Barranquilla has been considered. The Yariguy field of Shell in the middle Magdalena yields about 10,000 b/d from 17 wells.

Other discoveries of recent years, such as Sogamosa and Lebrija fields in the middle Magdalena or Gualanday in the upper Magdalena valley, have added little to the output of Colombia.

New concessions have not been granted since the middle of last year, with exception of the mentioned Empresa-Benedum lots. They amounted at that date, according to official figures, to 8,906,634 hectares, of which 5,174,930 were granted in western Colombia and 3,731,702 hectares in the Llanos area.

New amendments to the petroleum law shall reportedly be shortly submitted to Congress. Surface rentals and guaranty deposits shall be charged in dollars instead of the

(Continued on page 88)

Synthesis gas plant at Ijmuiden

The successful operation in Holland of Shell's first commercial gasification unit has led Mekog to plan installation of a second unit in its ammonia production facilities

by A. P. van Amstel*

THE MEKOG CO., a major ammonia producer at Ijmuiden, Holland, was founded in 1928 to utilize the coke oven gas from an adjacent steel works. Coke was later added as a second feedstock. However, steady expansion, coupled with a decreasing availability of coking coal, recently obliged the company to search for an alternative raw material.

The choice fell on oil, and ultimately on the new Shell process for the production of water gas from hydrocarbons. This process, which was developed by the Bataafse Internationale Petroleum Maatschappij (the Bataafse), a service company of the Royal Dutch/Shell group, was chosen because it has a number of advantages over other gasification processes.

At the end of 1956, the first commercial Shell gasification plant was installed in the Mekog works. As this was the prototype commercial plant, it was operated at first by Bataafse personnel to establish optimum operating conditions and to test the equipment in service. The results obtained in this period have been published elsewhere.[1] The gas produced in this initial stage was used by Mekog for the production of ammonia. In early 1958 the plant was officially taken over by Mekog and it has been operated continuously ever since as one of the gas generation units for ammonia production.

This article describes the process and the plant, and lists operating results and experience gained. The latter have been so favorable that Mekog has decided to install a second Shell Gasification plant.

The Shell gasification process is based on the partial oxidation of a hydrocarbon feedstock in the presence of steam by oxygen, by air enriched with oxygen or by air, depending on the application. The reaction is a continuous, non-catalytic flame type which takes place in a reactor especially developed for the purpose. The reaction conditions can be readily adapted to the feedstock selected. The process is capable of converting any hydrocarbons from methane through light gasoline to residual oil. The main products of the reaction are carbon monoxide and hydrogen, together with minor quantities of carbon dioxide, methane, hydrogen sulfide and carbonyl sulfide, the last products being formed from the sulfur in the feed stock.

A certain quantity of carbon (from a few tenths to a few percent by weight on feedstock) is also formed during the reaction. This amount can be kept within acceptable limits by a suitable choice of the oxygen-to-oil and steam-to-oil ratios.

The pressure at which the plant can be designed to operate ranges from 5 to 40 atm and even higher, if required. Apart from the flexibility which this offers, the possibility of working at high pressure enables a considerable reduction in the size of the equipment. The compact construction that results makes it feasible to produce relatively large quantities of water gas in small plants, thereby reducing to a minimum the amount of plot space required, as well as the heat losses. This high-pressure operation has also resulted in an attractive saving in compression costs for Mekog.

A feature of oil gasification processes is the high reaction temperature (approx. 1200-1500 C). A considerable economy can be effected if the exothermic heat of reaction can be utilized. Despite the presence of carbon in the gas, it has been possible to develop a waste heat boiler which can produce steam of any desired pressure in continuous operation. The steam produced is used for preheating the reactants and for injection into the reactor together with the feedstock and oxygen.

The waste heat boiler produces about 2.3 metric tons of steam per metric ton of oil gasified; 0.75 tons is used as process steam

*Mr. van Amstel is associated with N. V. Maatschappij tot Exploitatie van Kooksovengassen (Mekog Co.).

[1] M. Gattiker, *Erdol und Kohle*, Vol. 10, pp. 581-584 (1957).

TABLE 1—Typical Operating Data for MEKOG Fuel Oil Gasification

(Based on one metric ton of fuel oil with a Redwood I (100 F) viscosity of 3,500 secs.[1])

Oxygen consumption (as 100%) at 95% purity, approx., Nm³*	750
Steam produced in waste heat boiler (at 26 atm.), approx. tons	2.3
Steam used in reactor, approx. tons	0.4
Dry water gas produced (at 30 C and 20 atm.), approx. Nm³	2,950
Average composition water gas (vol-% on dry basis):	
Carbon dioxide	4.6
Carbon monoxide	47.0
Hydrogen	46.0
Methane	0.2
Nitrogen plus Argon	1.4
Hydrogen sulfide	0.8
Carbonyl sulfide as S, ppm	200-300
Carbon content, mg./Nm³	<1

[1] Analysis of feedstock: carbon, 84.6 wt-%; hydrogen, 11.3 wt-%; sulfur, 3.5 wt-%; oxygen, 0.13 wt-%; nitrogen, 0.4 wt-%; ash, 0.07 wt-%.
* Normal cubic meters, at 0 C and 1 atm.

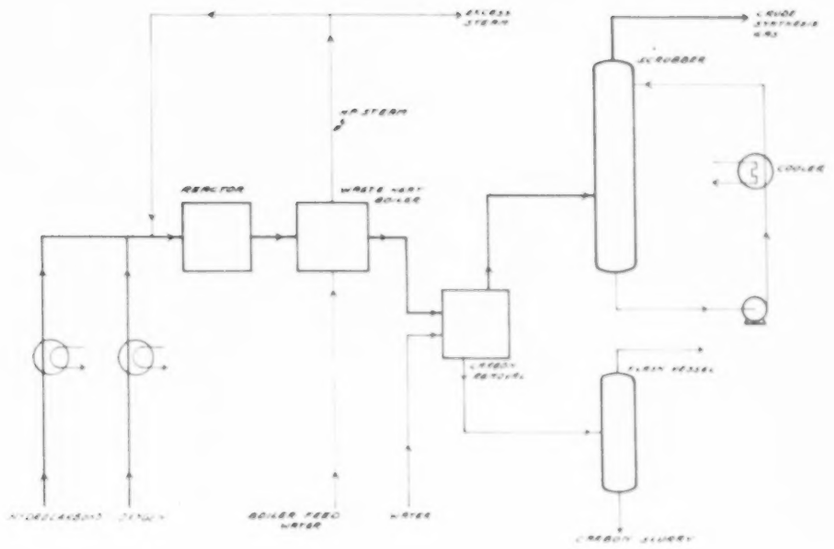


Fig. 1—Schematic flow diagram of the Shell gasification unit.

and for preheating oil and oxygen, leaving an excess of 1.55 tons, which is piped to the general steam system.

The carbon formed during the reaction is removed from the gas by a water wash, resulting in a concentrated carbon/water slurry (10-15 gm/liter).

The Mekog gasification plant was designed to convert 50 metric tons of fuel oil a day into water gas at a pressure of some 25 atm.

The oxygen, which comes from an air separation unit, is compressed by reciprocating compressors to about 30 atm. The preheating to about 220 C then takes place in coil-in-coil heaters with steam. The oxygen is then mixed with the steam required for the process and introduced into the reactor.

The fuel oil is pumped to a coil-in-coil preheater, in which it is likewise steam-heated to approx. 220 C before introduction into the reactor. The fuel oil, oxygen and process steam are intimately mixed in a combustor of special Shell-patented design before entering the reaction zone.

The reactor is lined with refractories backed by insulating material to minimize heat losses.

The reaction products pass to the waste heat boiler, where they are cooled down to a few degrees above the steam temperature (Approx. 230 C). The Mekog waste heat boiler incorporated a special feature obviating the necessity for boiler circulation water pumps. This of course means a saving in energy and contributes to the reliability of plant operation.

The gas coming from the waste heat boiler goes to the carbon removal section. Before leaving this section it passes as a double check through a scrubber in which the gas is further cooled to about 30 C. The carbon water slurry is subsequently flashed to atmospheric pressure is order to release dissolved gas.

The gas is further processed in a carbonylsulfide removal unit and hydrogen sulfide wash before it enters the CO conversion unit for the production of crude hydrogen.

The plant, which is fully monitored by automatic controls, is operated by two men per shift. Supervision is required on a part-time basis only.

Operating results and experience: The operation of the Shell gasification plant at the Mekog works has proved to be most satisfactory from every point of view since the plant was taken over.

Hydrocarbon oils ranging in viscosity from 800 to 3500 sec Redwood I 100 F and with sulfur contents of up to 3.5 wt-% have been gasified without any difficulty.

The throughput of the plant was varied in accordance with synthesis gas requirements from 35 up to 60 metric tons of fuel oil a day with no noticeable effect on the reactor or any other part of the unit or on the purity of the gas obtained. It is in fact believed that the plant intake could be increased still further, but in the absence of additional oxygen compression facilities at the Ijmuiden works this possibility has not yet been investigated.

Especially satisfactory is the very low carbon content of the gas leaving the plant, which facilitates its further processing in the hydrogen sulfide removal and CO conversion installations. The carbon content of the gas, as measured at the outlet of the scrubber, is invariably less than 1 mg/Nm^3 of gas. Typical operating data are shown in Table 1.

The on-stream factor for the plant was 92% in 1958, and is expected to increase even further in 1959.

Experience with the various items of equipment has been very favorable. The special refractory chosen for the reactor lining has performed extremely well and no replacement has been necessary since it was installed in 1956. The same refractory lining will probably last for several years to come. The vanadium oxide that could originate from any vanadium compounds present in the feedstock will not attack the refractory material under the reducing conditions prevailing in the reactor.

The waste heat boiler has required no cleaning or maintenance, since the start-up. Steam production remained constant. The design did not provide for any carbon removal facilities, and operation has in fact proved that no carbon is deposited in the boiler.

The entire gasification plant, except for the oxygen feed system, is constructed of carbon steel. Corrosion, however, was found to be negligible. Inspection of the unit after 18 months of operation showed that the wall thickness in different parts of the units was practically unchanged.

Operation of the Shell oil gasification plant at the Mekog works has given extremely satisfactory results as regards on-stream time, maintenance, ease of operation and yields. The process has proved to be a reliable component of the Mekog synthesis gas train. Experience has been such that Mekog has decided to erect a second Shell gasification plant. END

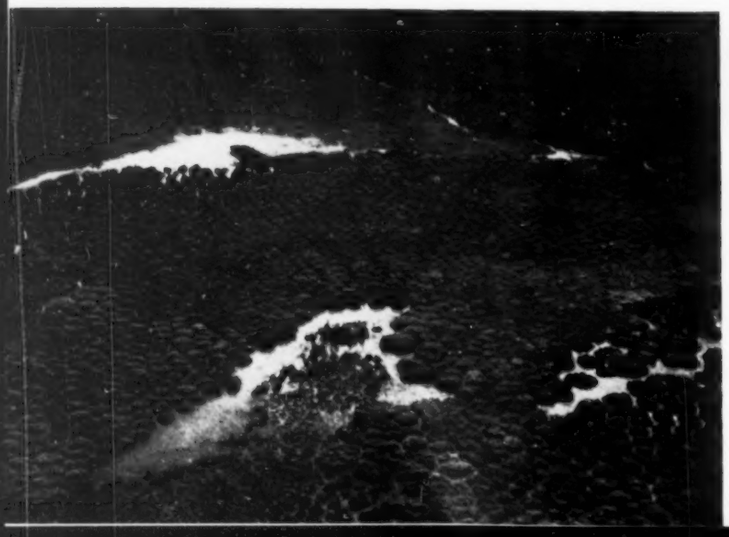
The end of a day's work. The instruments are ready for loading, the tub containing the sensitive apparatus will be attached between the helicopter's floats and the aluminum boxes filled with the other miscellaneous equipment will be attached to the top of the floats.

Doodlebugs in Colombia's Sky

How five helicopters are licking obstacles of season and topography in exploration of water-covered plains area of eastern Colombia.

by Fred L. Bernheimer and Jill C. Brown

One of the most difficult working areas for the seismic crew are these mushroom-like mounds interwoven with streams that are known as the Sorrales.



Both Mr. Bernheimer and Mrs. Brown are associated with General Geophysical Co. of Houston, Texas. Mr. Bernheimer obtained his B.S. in geological engineering from St. Louis University in 1952 and is party chief in charge of Colombian operations. Mrs. Brown, a graduate of Stephens College, is editor of the company magazine, News of Crews.

The surveying crew working under one of the extreme difficulties encountered in the Llanos.

By the extensive use of the versatile helicopter, General Geophysical Co. of Houston, Texas is conducting oil exploration in the tropical, water-covered land in the eastern part of Colombia. General's crew, working the Shell-Condor, S.A. and Mobil Oil Co. de Colombia concessions in the Llanos region of Colombia, are literally the doodlebugs of the sky as their entire operation revolves around the helicopter.

The Llanos is the plains area in eastern Colombia that stretches eastward from the Cordillera Oriental, the most eastern mountains of the Andes ranges. Generously laced with a network of rivers, this flat, cattle grazing land does not show any surface indications of structures. The substructure is being mapped by means of the gravity-meter and seismic survey to help determine the most likely spots for oil.

By the time General was awarded this contract, Shell-Condor had given the operation a great deal of thought and planning. The most difficult problem to be faced was to find a practical means of transportation. There are two very distinct seasons in the Llanos; the wet season lasts seven to eight months so there are just four to five months of dry weather when vehicles such as trucks could be used successfully. Boats too, are impractical because they can only cover a limited area.

It was logical to think of helicopters for year-around operation as most oil companies in Colombia used them at one time or another in their exploration work. When pursuing this idea, General came in contact with Helicopters Nationales de Colombia (Helicol), a company partly owned by Keystone and partly by Avianca, the Colombian International Airline Co. It was decided that five helicopters would do the job, four always on duty and one on standby or undergoing maintenance and inspection. Five Bell model 47 G helicopters are under lease from Helicol and assigned to the crew. With the "whirly-birds" the crew has complete freedom of movement, whatever the season, and can "shoot a line" regardless of rivers, lakes or other ground obstacles.

Surveyors, drillers, and instrument men are all dependent on the helicopters for transportation. It is therefore very important that the manager of the operation be a good organizer and that General's field staff and Helicol's pilots cooperate very closely. It is only this finely timed teamwork which results in the excellent production. As many as 28 successful "shots" have been taken in a single day and the crew averages 20 records a day, far above par on anyone's course. From six in the morning to four in the afternoon the helicopters lead from shot point to shot point, resembling a flight of grasshoppers.

The two surveyors, chief surveyor Harold Mueller and his assistant Jack "Red" Smith, two Texans who learned their trade in the West Texas oil fields, are responsible for staking out and surveying the seismic lines. After loading their "chain", flags, and instruments aboard the helicopter assigned them, the ship carries one surveyor and a rodman and their instruments to the starting point of the day. At this point the rodman climbs out, sets up the drum and surveying chain, and attaches the loose end of the chain to the helicopter. While the ship drags the cable 330 meters down the line (as measured by the chain), he takes a gravity meter reading. When the helicopter lands, the transit operator gets out, sets up his instrument, and takes an elevation observation on the rod set up at the previous shot point.

Each shot point is marked with a flag and the complete operation is finished in 7 to 10 minutes. Following the observation, the chain is disconnected from the helicopter so the pilot can fly back to pick up the rodman. Then the helicopter flies on down the line, pausing at the surveyor's position to again attach the chain. The helicopter then picks up the surveyor and the same procedure is repeated.

Working in harmony, the helicopter and survey team cover an average of 12 miles a day, leaving a trail of white flags 660 meters (some 720 yards) apart along the line, indicating the shot point locations. The geophone positions are not surveyed.

Drill crews are next. General Geophysical works two drills at all times, and sometimes three, under the charge of Eugene Pavlicek of Texas and Peter Watson of Scotland. Equipment for each crew consists of 2,000 lb of gear plus any water needed to drill each 50-foot hole. Two types of drills are employed, portable hydraulically operated drills equipped with auger stems being used in the dry areas. If water is

Above: The surveyor watches the "chain" being unreeled as the helicopter drags it down the line.

Left: Unloading lightweight tent frames for the base camp. Notice the rack, attached to the "floats" of the helicopter, designed to carry the camp, drill and shooting equipment.

easily obtained, centrifugal water pumps powered by a gasoline engine are put into action. Five months a year, during the dry season, water must be flown in by helicopter to the drill from the nearest river or pond. The helicopter requires just five trips to move each shot hole drill crew. Once the hole is completed and charged with dynamite, the drill crew moves on, leapfrogging the other crew already working on the next hole.

The seismic instruments and their men are next on the agenda, either being flown in at this time or preparing for operation if they are in position. Two two-man crews operate on the ground. One team lays out the seismograph cable and attaches 12 geophones to it in advance of the instruments, while the other crew picks up the line and geophones from the previous spread.

A special instrument tub is used to transport the recording equipment. Made of lightweight fibreglass, the tub or boat was designed by General, counseled by Helicol, and fits between the helicopter's floats, being attached with quick fasteners. Rectangular in shape, the boat measures one meter by two meters and is forty centimeters deep, facilitating actual recording from the disconnected boat without removing any of the sensitive apparatus.

Because the tub is made of lightweight fibreglass it has the ability to float with a full load of instruments, a necessary feature in the Llanos during the long rainy season when the plains are covered by a blanket of water; the tub also permits operation in deep water. Miscellaneous equipment and supplies are carried in aluminum boxes attached to the top of the floats. Four trips are needed to deliver all instruments and personnel to each location.

Canadian Reginald Ulmer, chief observer and assistant party manager, and a Welshman, Keith Weaver, are the two seismic instrument observers. Their daily progress is what counts, for the "shot" records are the basic product of the field party. The seismic data is recorded simultaneously upon a conventional 10-inch paper seismogram and magnetic tape. A total of 24 channels of reflected seismic and two channels of auxiliary information is recorded on both mediums. Twice weekly the party manager, Aradath Gailey of Corpus Christi, Texas, sends the seismic records to General Geophysical's Colombian party chief, Fred Bernheimer, in Bogota. Here the information is mapped and passed along to the oil companies.

Only with the helicopter can this seismic work be planned efficiently and executed on schedule. General's crew, using the described method of operation, has shot as many as 327.4 kilometers (204 miles) in a single month and covered approximately 9,240 square kilometers in their first year of operation. The flight statistics for this work are nothing less than fantastic. In the first year on the job (April 1, 1958 to March 31, 1959) in a total of 38,066 loaded trips the helicopters logged 7,586 hours in actual, productive, on-the-job, flight time and made the astronomical total of 300,000 take offs and landings.

As far as it is known, no other survey is being conducted in this manner . . . but then, they said it couldn't be done. Many problems had to be solved. Other than the transportation, there was the housing for the 25 seismic and helicopter personnel plus 20 to 50 laborers, supplying the crew originally with equipment and spare parts, planning and executing the base and field camp moves to convenient locations and many, many others—but they are stories in themselves. With the doodlebugs of the sky, an entirely new concept of operation had to be accepted in order to produce this highly efficient operation. Due to the farsightedness of the personnel from Shell-Condor, S.A., Mobil Oil Co. de Colombia, General Geophysical Co. (Bahamas) Ltd., and Helicopters Nationales de Colombia, this regional seismic survey has proven to be highly successful, and the results are very gratifying.

END

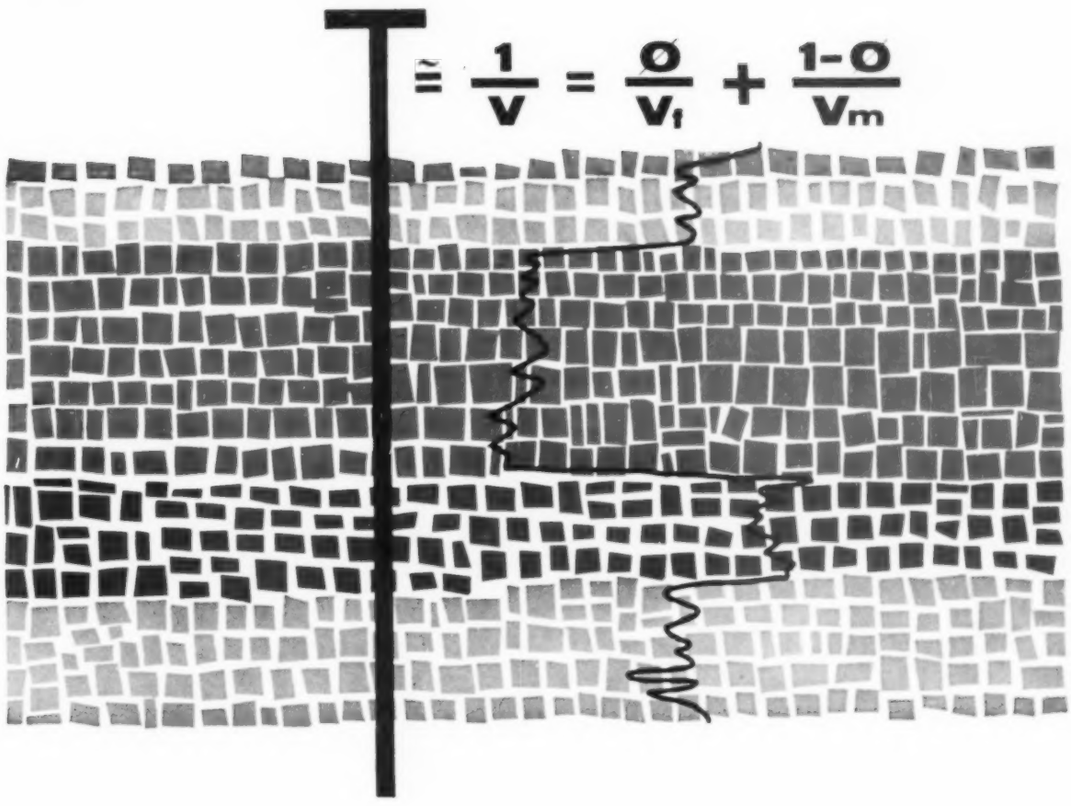
SCHLUMBERGER SONIC LOG

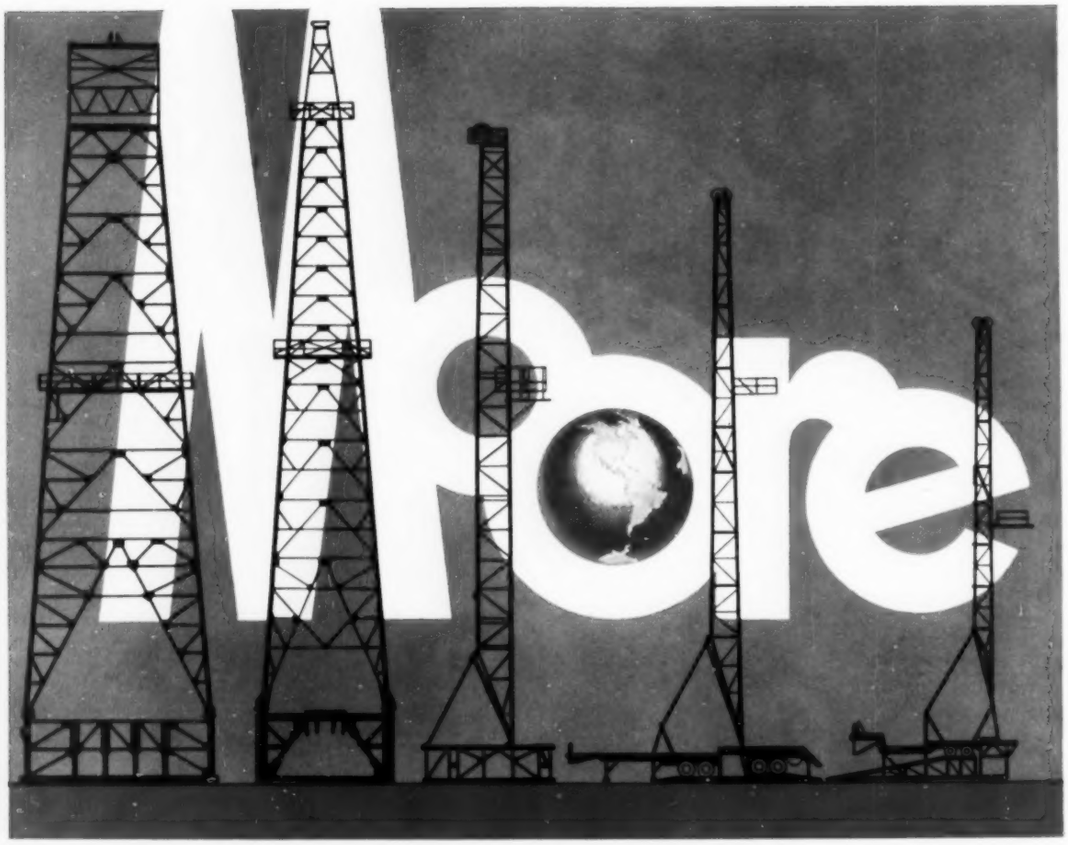
For all practical purposes, the velocity of a sonic wave is controlled by the formation porosity and the fluid in it.

The Sonic Log gives an accurate porosity measurement.

Detail recording gives excellent correlation.

Better interpretation of seismic data.





A TYPE AND SIZE STRUCTURE FOR EVERY DRILLING REQUIREMENT

LEE C. MOORE masts have been used for drilling in the bleak Arctic regions where structures must withstand actual wind loads up to 100 m.p.h. and where special housing was furnished for protection of personnel and equipment against extreme cold.

Our trailer-mounted units have provided the maximum portability required of drilling equipment for transporting over rough desert terrain.

Lee C. Moore multiple well derricks have made it possible to drill a series of wells from one setting of the derrick on over-water platforms.

We have designed drilling structures to break down into sections of appropriate size and weight for transporting by helicopter and conventional aircraft into otherwise inaccessible jungle areas.

The continuing program of study and research conducted by our design engineers assures the drilling industry of structures best suited to specific requirements.

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How luminosity affects jet fuel qualities

Luminosity, a property recently discovered to be critical in jet aircraft fuels, is extremely low in the new jet fuel developed by Texaco, according to L. C. Kemp, Jr., vice president in charge of research. As a result, it promises to increase jet aircraft lifting power, extend non-stop flight range and engine life, and drastically reduce the emission of exhaust smoke on take-off.

A low luminosity fuel is one which gives off only a small amount of radiant heat and is therefore more efficient in the conversion of its energy into jet engine power, or thrust. Ordinary kerosine is an example of a high luminosity material. The reason for this is that incandescent molecular fragments are formed in a kerosine flame, causing it to glow or become luminous. These luminous fragments are the source of radiant heat which can seriously increase hot metal temperatures inside the combustor of the engine.

Thus a low luminosity fuel can be burned at higher temperatures than conventional fuels without overheating the engine, permitting the jet to develop greater thrust and provide other improved qualities.

"We foresee this new fuel," Mr. Kemp said, "as making possible the same sort of revolution in jet engine performance and mechanical development that took place in automobiles through the introduction of high octane gasoline." The reason for this, he explained, is that present jet engines have not been designed to take full advantage of the new low luminosity fuel.

"In fact," he predicted, "jet fuels in the future will be rated by a Luminometer Number, or L.N., which may well open up a race in jet fuels very similar to the octane race."

A jet fuel is given an LN rating according to how little radiant heat it gives off during burning, he said. The higher the LN, the lower the radiant heat and the more desirable the fuel. Most jet fuels now have an LN rating between 45 and 65, whereas the new Texaco fuels are rated at 135 and up, according to Mr. Kemp. The company did its development work on luminometer ratings at virtually the same time it devised methods to manufacture high LN fuels in commercial quantities.

Engine tests using almost 25,000 bbl of the new fuel have already been carried out by major aircraft engine builders as well as in Texaco's own laboratories, Mr. Kemp reported.

How fuel luminosity is tested. The Coordinating Research Council (CRC) Luminometer Test has been found to be a useful tool in classifying the flame radiation tendencies of fuels.

In this test a sample of fuel is burned, as illustrated in Fig. 1. Flame radiation is measured by a photoelectric cell. Temperature rise across the flame is measured by two thermocouples. The temperature rise at a given level of radiation is used to rate the fuel; the greater the rise at the level, the better the fuel. These fuel ratings are given as Luminometer Numbers, which are calculated by comparing the temperature rise of the test fuel with those of tetralin (LN — 0) and isooctane (LN — 100). High LN ratings indicate less flame radiation and less carbon formation.

The effects of fuel LN on combustor liner temperature in a modern engine are shown in Fig. 2. These data were developed as part of the Texaco investigations of aviation turbine fuel combustion performance. Engine tests of the high LN fuels demonstrated significant reductions in temperature relative to conventional fuels. Reduction in engine parts temperatures can result in longer life for these components.

Or, for the same parts temperature and life as with a conventional fuel, the engine gas temperature can be increased when using high LN fuels, with resulting increases in engine cycle efficiency and power.

The relationship between exhaust smoke and fuel LN in a full scale engine combustor is shown in Fig. 3. Tests in both the full scale combustors and in complete engines have confirmed that the high LN fuels drastically reduce smoke relative to conventional kerosine and wide-cut fuels, and are especially helpful when water injection is used.

Texaco high LN fuels are "selected hydrocarbons especially processed to provide very high LN, over 135." The types of hydrocarbons required exert an important influence on fuel volatility; however, the fuels can be produced to provide volatilities consistent with requirements, Texaco said.

A number of improved properties other than low luminosity also result from the

(Continued on page 88)

Fig. 1—Flame radiation-Luminometer Number.

PRINCIPAL SOURCES OF GASEOUS RADIATION AND OF VARIATION OF RADIATION WITH FUEL COMPOSITION.

1. EMISSION FROM GLOWING CARBON PARTICLES.
2. EMISSION FROM CO_2 AND H_2O, THE FORMER BEING MORE IMPORTANT.
3. CHEMILUMINESCENT RADIATION, (CH) RADICALS AND OTHER COMBUSTION INTERMEDIATES.

EMISSION IS PROPORTIONAL TO $1-e^{-cal}$, WHERE:

c– IS THE CONCENTRATION OF THE EMITTING SUBSTANCE
a– IS THE AREA OF THE HOT GAS ENVELOPE
l– IS THE LENGTH OF THE RADIATION PATH

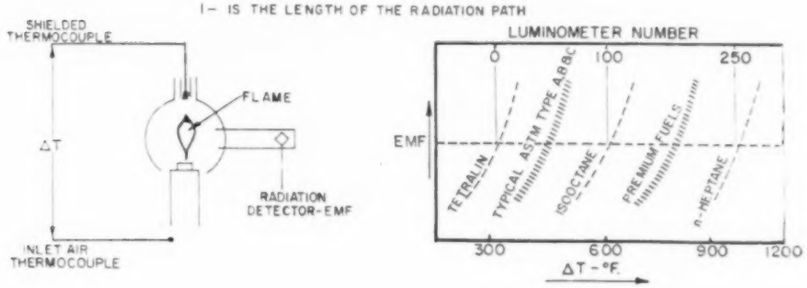


Fig. 2—Effect of LN on engine combustor liner temperature.

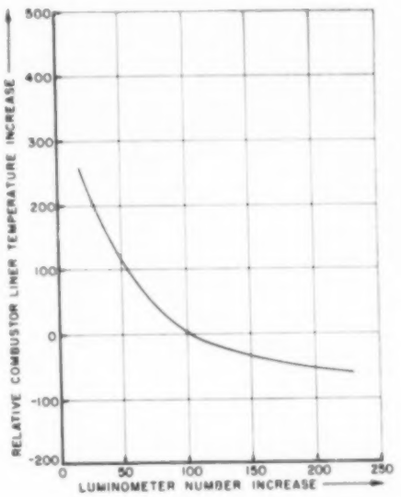
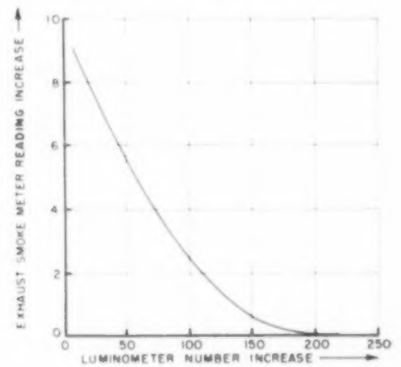


Fig. 3—Effect of LN on engine exhaust smoke.



Customer fuels are prepared for road rating in Ethyl's controlled-weather chassis dynamometer room.

Ethyl Research evaluates current premium fuels

Makes Results Available to Industry

One hundred thirty-one motor gasolines—112 premium and 19 super premium fuels—have been thoroughly tested in the laboratory and on the road in Ethyl's latest study of premium fuel performance.

Results of the study—including road performance evaluations for both full throttle and part throttle operation—are available to refiners as an aid to understanding current fuel problems and planning future fuels. In addition, Ethyl Research has expanded and brought up to date its system for calculating road performance from routine laboratory data.

All tests were conducted at Ethyl's Detroit Research Laboratories. Road tests were made in five 1959 cars and three test cars equipped with experimental high compression engines.

Of special interest is the information on part throttle operation since some late model cars are knock-limited at part throttle.

Summary of Ethyl Research Findings

1. Laboratory octane numbers may be used to provide estimates of road antiknock performance in 1959 cars. Whether Research or Motor octane number is more important varies with the car, engine speed and throttle setting.

2. A fuel property such as hydrocarbon composition and either Research or Motor octane also is a good index of road performance.

3. Low speed road performance in 1959 cars at full throttle operation depends primarily on Research octane number. For high speed, Motor octane is more important.

4. Experimental high compression cars were more ap-

preciative of Research octane number than the 1959 cars.

5. Part throttle road behavior is controlled almost entirely by Motor octane. An increase of sensitivity is generally detrimental.

6. Where Research octane is the same, fuels with maximum paraffin hydrocarbons give optimum road performance.

7. Where Research octane and sensitivity are the same, fuels with more aromatics and less olefins show better road performance at high speeds.

Scope of the Test Program

Fuels tested in this study were obtained from 114 refineries representing 77 percent of the motor gasoline produced in the United States and Canada.

More than 3,500 separate laboratory tests were made, including 1,820 CFR engine tests. And more than 16,000 road ratings were made—14,200 at full throttle and 2,000 at part throttle—with the fuel samples blended to a TEL concentration of 3.0 ml per gallon.

The empirical correlation between road antiknock behavior and the laboratory characteristics of current premium gasolines was exhaustively re-examined to provide an accurate, up-to-date means for study of current fuel performance in today's cars.

Work with experimental high compression engines produced data which will be of great help in predicting future fuel performance and requirements.

AVERAGE COEFFICIENTS IN EQUATION RELATING ROAD OCTANE NUMBER TO LABORATORY VARIABLES

$$\text{Road ON} = a + b\,(\text{Research ON}) + c\,(\text{Motor ON}) + d\,(\%\ \text{Olefins})$$

FULL THROTTLE

FIVE 1959 CAR AVERAGE	A	B	C	D
Modified Uniontown	28.90	0.419	0.325	−0.038
Modified Borderline				
2000 rpm	11.48	0.644	0.273	−0.027
2500 rpm	26.84	0.408	0.359	−0.054
3000 rpm	27.50	0.371	0.386	−0.083
3500 rpm	21.99	0.313	0.502	−0.107

How Ethyl Research can help you

Since 1946, Ethyl Research Laboratories in Detroit have studied laboratory and road performance of premium grade gasolines at periodic intervals. This recent program is the largest undertaken.

For oil company statistical groups that wish to make further computer analysis of the data, Ethyl Research will supply a deck of IBM cards containing all available fuel variables and all road ratings for fuels at full throttle. Cards also are available for part throttle ratings for 28 car-speed combinations on 30 fuels.

Copies of the report compiled on this program entitled, "1959 Premium Gasoline Antiknock Behavior," may be obtained from your Ethyl Representative. He will gladly arrange for a presentation by an Ethyl Refinery Technologist.

ETHYL CORPORATION
New York 17, N. Y.

Ethyl Corporation of Canada Limited, Toronto
Ethyl USA (Export) New York 17, N. Y.

RESEARCH LABORATORIES — Ferndale 20, Detroit, Michigan • Baton Rouge, Louisiana • San Bernardino, California

Camdrill's Oasis Desert Star Group: E. L. "Hi" Pierotti, Libyan Superintendent of Camdrill. Gordon Wilbur, Manager Foreign Sales, IDECO. W. H. "Bill" Mannon, Vice President-Engineer, Camdrill. G. W. "Jack" Walton, President, IDECO. J. D. McBrater, Ohio Oil Co., R. C. "Dick" Kerr, Camdrill Consultant, Engineer. R. M. Churchwell, Manager Foreign Operations, Ohio Oil Co. Tyler F. Woodward, President, Camdrill. Raymond O. Turner, Vice President, Camdrill. Orville Stanford, Camdrill Supervisor, Oasis "Desert Star" Libya.

Mobile rigs lick Libyan desert drilling problems

AIMED AT PROVIDING the most efficient method possible for oil exploration in open desert country, two new completely mobile, highly unitized, compact drilling rigs have been produced by Camdrill International, Inc. for use in the Libyan desert exploration effort.

Named the "Desert Star" drilling rigs, the No. 1 unit has been in operation since late December, 1958, for Esso Standard (Libya). The No. 2 rig was completed and shipped to Libya late in September, where it will work for Oasis Oil Co. of Libya (Ohio Oil-Amerada Petroleum-Continental Oil combination).

Camdrill's objective was to develop a rig flexible enough to drill from 4,000 to 10,000 ft with maximum efficiency, simplicity in assembly, and maximum ability to traverse offroad desert country. Tyler F. Woodward, president, and Raymond O. Turner, vice president, assigned the project to vice president William H. Mannon, who worked in cooperation with the manufacturer, the operating oil company, and the oil firm's trucking advisors. The services of R. C. Kerr were obtained as an engineering consultant for offroad sand flotation; he had had experience in moving heavy loads under all kinds of conditions in the Saudi Arabia desert for Aramco.

Ideco was chosen to assemble the first Desert Star after J. A. Clark, then president of Esso Standard (Libya) Inc. had accepted an incentive footage rate drilling contract for his company's operations in Libya, using this type of drilling equipment.

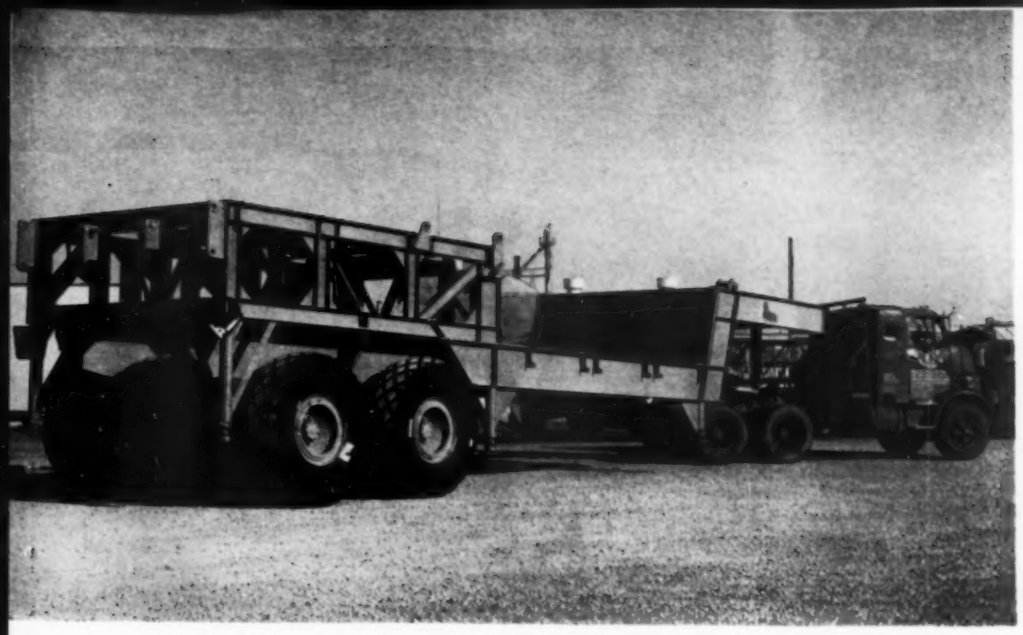
Esso wanted a unit which would save from five to ten days on each move, was capable of drilling economically to 8,000 ft or more, and with relatively low cost so that operation economy would be reflected in actual drilling time as well as time saved in tear-outs, moves, and rig-ups.

Final selection was an Ideco H-525 draw-works, VT-12 Cummins diesels, Emsco D-300 slush pumps, Eidal Mfg. Co. bogies, and Lee C. Moore 127 portable mast and sub-structure, both to be mounted on an independent unit; the sub-structure which was also to be one trailer, with Ideco Shorty traveling block, hook, rotary table and other Ideco drilling equipment items.

This rig was assembled and shipped to Libya, arriving there on December 28, 1958. It was loaded off, put through customs, and was actually drilling in Concession No. 1 in the Fezzan Province 17 days later. The hole was deepened to 8,676 ft, cored, tested, cased, and later abandoned. The rig was then moved to another location in the same concession near the Algerian border and again drilled to about 8,700 ft in good time, with record time for the move. More recently, the rig was moved approximately 1,150 miles to Esso's Concession No. 6 near the Zelten discovery area.

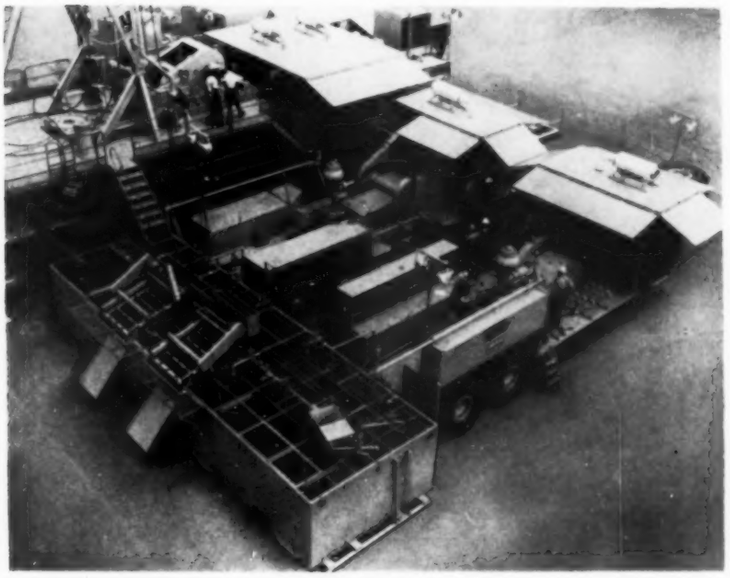
Desert Star No. 2, shipped to Libya late in September for Oasis, is a close reproduction of the first rig, but powered with four Caterpillar 12 cylinder diesels and equipped with a new Ideco dual lift portable mast capable of handling trebles. One larger pump, a new Ideco 600 hp unit, was mounted on one of the pump trailers, coupled with one of the diesel engines and equipped with a propeller shaft drive from the two draw-works diesels. The second pump trailer was a duplicate of the second pump trailer on the No. 1 rig except for the change in engine. The No. 2 rig will use X95 Youngstown, lightweight, 4½-in drill pipe, and can penetrate to approximately 12,000 ft.

Camdrill International, a sister company of Camay Drilling Co. of California, has ten contracts with five of the large USA operating companies exploring and developing Libyan concessions. Its Libyan operation is under the direct management of Scott A. Murray, general manager in Libya and the Mediterranean region. Murray, who has spent the past six years in the Mediterranean regions of Egypt, Italy, Sicily, and Libya, is assisted by R. V. Towner, manager of Camay operations in Algiers; E. L. Pierotti, drilling superintendent in Libya; Ed Porter, personnel manager in Libya; and Lester Rojas, assistant drilling superintendent and supervisor of the Benghazi, Libya, office of Camdrill. END



Desert Star No. 1 was mounted on two trailers. Shown here is the mast trailer before the 126-ft. retractable, 420,000-lb gross capacity mast was installed by Lee C. Moore.

Elevation view of the "Desert Star" showing 127 ft mast extended with utility trailer in foreground.



Overhead view showing drawworks trailer, two pump trailers and 500-bbl mud system for Desert Star No. 2. The photograph shows how thoroughly mobile the rig has been made for desert service.

Drawworks and engine trailer section of the dual trailer unit built by Lee C. Moore for Camay Drilling Company's Desert Star No. 1. The trailer has a built-in fifth wheel hoist and screw jacks for leveling.

New Esso Research and Engineering Co. center at Florham Park, N. J. which will house 800 engineers and process research scientists.

Jersey Standard's Boyer cites contributions by technologists as company dedicates large new technical center.

Engineering and research reduces oil's capital costs

RESEARCH and engineering technology reduces the petroleum industry's capital costs about 5% per year, according to Marion W. Boyer, director, Standard Oil Co. (New Jersey).

Mr. Boyer made this point in an address dedicating a new research and engineering Co. in Florham Park, N. J. last month.

In the case of Jersey Standard's worldwide operating affiliates who last year spent nearly $500 million on new and improved refining equipment—this would amount to a saving of almost $25 million. In a study to discover how this advancing technology would have affected a specific refinery, Esso Petroleum Ltd.'s Fawley, England plant, Jersey's engineers found that it would have been possible to duplicate that refinery for about 70% of its original cost some five years ago.

Conventional petroleum refining is not the sole concern of Jersey's research and engineering people. As an indication, Mr. Boyer said: "We find that Jersey's investment in petrochemical projects has nearly doubled since 1957. We expect it to reach $300 million next year, with 45% of it having been spent outside the United States. By 1962, this cumulative expenditure should have increased to about $400 million, 50% of this in other countries.

Esso Research and Engineering Co. has developed a number of processes and products of major importance over the 40 years since it began. These include Fluid catalytic cracking, Fluid Coking, Hydrofining, Powerforming, butyl rubber, synthetic lubricants for jet aircraft, fungicides, and a number of petrochemical materials. Its annual expenditures on research are running to about $54 million, a substantial portion of the approximately $66 million total expenditures on research by all Jersey Standard affiliates.

The new Florham Park center is headquarters now for some 800 researchers, engineers, and supporting services personnel. These engineers today are planning and supervising about $350 million worth of refinery construction and modernization around the world, Mr. Boyer said.

"The birthplace of Jersey Standard refineries around the world . . . a miniature, technical United Nations," were the phrases Mr. Boyer used to describe the new center, where work is carried on for affiliates which operate in more than 135 different countries. At any given time, some 100 or more of the engineers is away on an overseas assignment. In addition, each year about 100 engineers from affiliates come to Esso Research and Engineering Co. for training or consultation, staying anywhere from a few days to many months.

"Since the end of World War II, company affiliates have built, or have under construction, 24 refineries," Mr. Boyer pointed out, "and in the last decade alone, they have made capital expenditures for refining equipment of some $1.7 billion."

New refineries engineered by Esso Research have recently gone into operation in Bordeaux, France; Koln, Germany; and Whitegate, Ireland. At present, the engineering groups are working on 12 different plants for 11 affiliates; including those at Slagen, Norway; Milford Haven, Wales; and Rotterdam, the Netherlands. Plans are also being developed for a new refinery at Karlsruhe, Germany, and a second petrochemicals project at the Köln refinery.

Not all the actual work is being done at Florham Park, Mr. Boyer added. For example: part of the design engineering for the Norwegian refinery is being done in Italy. Steel for a number of the tanks is being furnished by Japanese firms. And the Norwegians themselves are handling site preparation and dock facilities.

The new Florham Park facility, located on a 675-acre plot some 18 miles west of the company's major research facilities at Linden, N. J., has been about a year in actual construction. Initially, it will include three buildings devoted to engineering and process research. The other phases of company activities continue at the Linden laboratories in some 20 buildings.

Largest structure at the Florham Park site is an office building primarily for the engineering personnel. Three stories high with a 640 ft frontage, it contains a computing center, library, and a 500-person cafeteria overlooking a courtyard.

A feature of the computing center in this building is an IBM 704 digital computer which has a new magnetic-core memory component with a capacity for storage of 32,000 words. This computer can total all the numbers from 1 to 8,000 in one fifth of a second. In one day it can perform all the calculations it would take 35 skilled mathematicians their entire lives to work out. In addition, there is a large Electronics Associates analog computer. This equipment includes five graph plotters for recording outputs, plus a special oscilloscope for plotting up to eight output curves simultaneously.

The second main building at the new center is the process research building with an 11,000-sq ft bay area that is almost four stories high. In this area, new processes and improved versions of older techniques are scaled up into pilot plant units. END

Like Today's Super-Highways...

there's more to Cities Service than meets the eye!

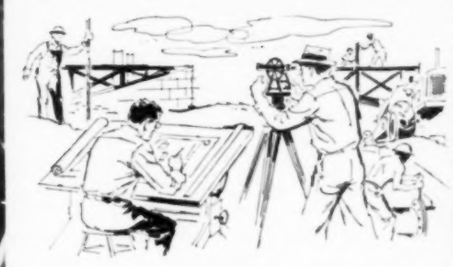
The New Jersey Turnpike is one of the world's greatest highways. To build it required 23 months of labor by 10,000 workers . . . a mountain of materials, including tons of Cities Service asphalt . . . and the expenditure of $255,000,000.

A casual trip along the turnpike does not reveal these facts any more than its 14 Cities Service stations reveal the full scope of Cities Service enterprise.

Serving the petroleum needs of America today is a big job. So that it can do its share of this job, efficiently and economically, Cities Service has invested more than a billion dollars in modern facilities.

And what of the years ahead? Building for the future . . . preparing for greater tomorrows . . . Cities Service is expanding constantly. In the past two years it has spent over $350 million on this progressive program.

Only in this way can America be assured of what she needs for progress . . . more jobs, more and better petroleum products.



It required 80,000 man hours a day for nearly two years to complete the New Jersey Turnpike. This year, this showcase of modern engineering will accommodate 41 million motorists.

CITIES SERVICE

OIL'S FIRST CENTURY
BORN IN FREEDOM
WORKING FOR PROGRESS

U. S. DEPLETION VS. INTERNATIONAL PRODUCTION

by Dillard Spriggs and John Lichtblau*

BECAUSE U. S. income tax laws, including percentage depletion allowance, apply to profits earned by U. S. oil companies operating abroad as well as in the U. S., proposals have been made in the Congress to limit or eliminate such exemption. Any action should be considered carefully, however, with full understanding of both the U. S. and other country tax systems.

Percentage depletion applies to foreign oil producing operations as well as to domestic crude oil production. In the same manner, U. S. income tax statutes apply to the earnings derived from foreign oil production, just as they do to domestic activities. This follows from the general principle incorporated in Federal tax laws that the U. S. income tax should universally cover all investment income, without discrimination as to the geographic source of such earnings. Thus, income earned by U. S. corporations in foreign countries is subject to the Federal income tax.

However, in order to prevent the double taxation of the same income, the U. S. law allows domestic taxpayers to credit any foreign income tax payments against their U. S. income tax liability. Therefore, an understanding of taxation of earnings from foreign oil production, and the relevance of percentage depletion in such cases, requires an appreciation of both U. S. and foreign tax systems.

Prevention of Double Taxation: Federal tax legislation recognized early that the universal application of U. S. taxes to income earned abroad could conflict with the taxing powers of other countries. That is to say, an American corporation operating abroad would be subjected to income taxes imposed by a foreign country as well as to those levied by the United States. Such double liability, as is obvious, would work severe hardship on any American enterprise conducting business abroad. Few corporations could be expected to venture into foreign operations if they were required to pay both a U. S. tax and a foreign tax on the same income.

The first U. S. income tax statute enacted in 1913 recognized this problem and provided that foreign taxes could be treated as deductible expenses. This deduction lowered the base on which the U. S. income tax was assessed. However, this procedure solved only partially the problem of double taxation of the same income and it was soon deemed unsatisfactory. Therefore, when U. S. tax rates increased sharply in 1918, Congress provided that any foreign income tax payments by a U. S. corporation could be credited against the U. S. income tax. The use of this credit substantially solves the problem of double taxation on the foreign income of U. S. business concerns, although it can never reduce payments below the applicable U. S. income tax rate.

This is illustrated in Table 1, which compares the method of treating foreign tax payments of domestic companies as credits with the method of treating them as deductible expenses. The illustration, applicable to any type of business, demonstrates that the use of the deduction method results in some double taxation of U. S income earned abroad while the credit method eliminates this additional burden.

The credit for foreign taxes has become an integral part of U. S. tax law. It has been reaffirmed several times in U. S. legislation and in over twenty tax treaties with other countries.[1] It should be emphasized that, if the foreign tax is lower than the U. S. tax, then the U. S. tax is assessed. Of course, when the foreign tax exceeds that of the United States, no refund is payable to the enterprise under the U. S. tax law. These are very important principles to be remembered in any consideration of the tax obligations applicable to American companies producing oil abroad.

TABLE 1—TWO METHODS OF DETERMINING TAX LIABILITY

Assumptions:

Net Income before Tax	$1,000
Foreign Income Tax rate	40%
U. S. Income Tax rate	50%

Calculation of U. S. Tax Liability:	Deduction Method	Credit Method
Income Subject to Tax	$1,000	$1,000
Deduct Foreign Tax (40% rate)	400	—
Balance Subject to U. S. Tax	600	1,000
U. S. Tax Liability (50% rate)	300	500
Credit for Foreign Tax	—	400
Actual U. S. Tax Liability	300	100
Total U. S. and Foreign Tax Liability	700	500
As % of Pre-tax Income	70%	50%

Foreign Taxation of Oil Producing Ventures. High fiscal obligations have been imposed on crude oil producing operations outside the United States by the governments of the countries concerned. Over the years, a pattern which approximates a uniform system of taxation has evolved in each of the important oil-producing areas abroad —Venezuela, Kuwait, Saudi Arabia, Iran and Iraq—and has spread to other less important oil countries. This pattern is generally referred to as the 50-50 profit-sharing arrangement. In brief, it provides that the combination of royalty payments, income taxes and certain other direct taxes payable to the foreign government by an oil-producing concessionaire must at least equal the concessionaire's net profits.

The ruling factor in these arrangements is the foreign taxing authority's determination to secure a minimum of a one-half share in the profits of the enterprise. The components of this share—i.e. royalties or income tax payments or other direct taxes—are not so important to the authority as the fact that the concessionaire's payments should at least equal his net profits. The manner in which these laws were developed provides evidence of this fact.

When Western oil companies first started to operate abroad most of the oil-bearing countries of Latin America and Asia had no income tax code. However, the payment of royalties to the sovereign for concessions granted was an established method of revenue collection in these countries. Consequently, U. S. oil-producing companies in these areas were originally assessed only royalty payments, usually at one-sixth or one-eighth of the value of the oil produced or at a flat fee per barrel. Until the beginning of the 1940's, these payments constituted the major fiscal obligations of oil concessionaires abroad. Subsequently, however, all these countries introduced income tax laws for both foreign and domestic residents and business concerns. Thus, in the 1940's and early 1950's, when their governments desired higher revenues from foreign oil operations, they accomplished their aim by imposing an income tax, in addition to the royalty payments, so as to raise the total fiscal burden of foreign oil companies to a level of at least 50% of the profit of the venture.

It must also be noted that today the 50-50 arrangement no longer represents the upper limit of the fiscal burden on oil pro-

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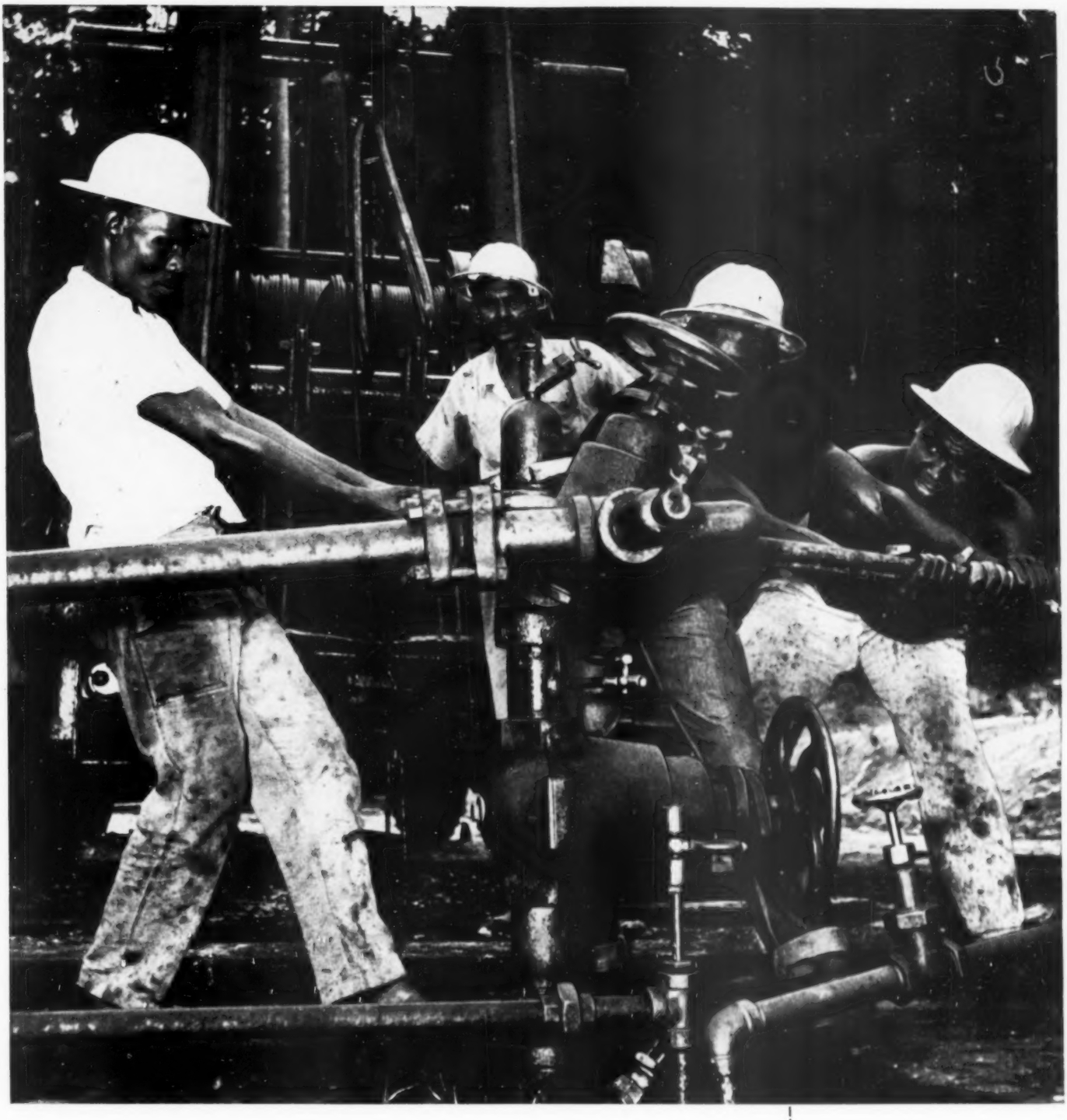
*Dillard Spriggs is head of the oil department of Baker, Weeks & Co., New York investment firm. John Lichtblau is Director of Research of the Petroleum Industry Research Foundation. This article is an excerpt from the author's book entitled "The Oil Depletion Issue," published in October by the Petroleum Industry Research Foundation. The book, a survey of all major aspects of percentage depletion, is available from the Foundation, 122 East 42nd Street, New York, New York, at $2.60 per copy.



Trinidad. A production crew carry out service on a wellhead assembly. British Petroleum has a 77% interest in the Trinidad Petroleum Development Company Limited, which last year produced nearly three-quarters of a million tons of oil.

BP

duction in all foreign countries. The Government of Venezuela, the largest oil-producing country in the world outside the United States, increased the income tax at the end of 1958. This action has raised the total fiscal payments of foreign oil companies in Venezuela to at least 60% of total profits. Other oil-producing countries have indicated a desire to do likewise.

The fiscal obligations payable to foreign governments provide the framework within which the U. S. taxation of American companies abroad must be viewed. In connection with the actual operation of the tax credit principle, it should be emphasized that the credit applies only to income tax payments abroad. No credit is authorized for royalty payments levied abroad, although, realistically, they are an integral part of the total fiscal obligation established by the foreign oil-producing countries. Thus, for U. S. tax purposes, such payments are treated in the same manner as domestic royalties.

The percentage depletion provision rounds out the U. S. tax treatment of earnings on foreign oil production. As in the case of domestic operations, this provision lowers the effective U. S. tax liability. While percentage depletion is contained in the laws of at least 12 oil-bearing countries, it is not statutory in the major foreign producing countries, except Canada and a few others. Hence, the foreign income tax, by virtue of the tax credit principle, usually offsets the U. S. tax liability fully. In fact, American companies producing crude oil abroad generally pay higher income taxes to foreign governments than they would to the U. S. government if they conducted the same operations domestically.

The actual incidence of income taxation on two of the most important American oil companies operating abroad illustrates this fact. In 1958, for example, Creole Petroleum Corp., which is the largest oil-producing company in Venezuela, paid $223 million to Venezuela just in the form of income tax.[2] This was equivalent to 47.2% of the company's pre-tax net income and, thus, represented a considerably higher comparable tax burden than is generally incurred by U. S. domestic oil corporations of similar size and type. The experience of Arabian American Oil Co., the operator of the oil concession in Saudi Arabia, provides another example. During 1955, the latest year for which data are available, this company paid $193 million in income taxes to the Saudi Arabian government, or about $38 million more than it would have had to pay the U. S. government if it had conducted the same scope of operations domestically.[3] Of course, a domestic oil corporation would also be subject to state and local taxes. However, these payments have a counterpart in Saudi Arabia and other less developed countries in the form of oil company expenditures on schools, roads, hospitals, sanitation facilities, etc., all of which are financed in this country by local and state governments.

Effects of Removal of Percentage Depletion from Foreign Oil Production. The foregoing considerations are relevant to any analysis of the percentage depletion provision as it applies to foreign oil producing ventures. It has been claimed that the removal of this provision from such ventures would increase U. S. income tax revenues. However, serious doubt exists as to whether this result would in fact ensue. It is perhaps possible that in the short run U. S. tax revenues would increase.

It seems likely, however, that the duration of any such increase in U. S. tax revenues would be short-lived because of the strong desire evident in most foreign countries to exercise full taxing authority over earnings gained from the exploitation of resources located in their territories. Their governments believe that taxation of such earnings by other countries represents an invasion of their fiscal jurisdiction as well as an undesirable outflow of funds. One of the major grievances which the Government of Iran expressed during the Anglo-Iranian dispute in 1951 was that the British Government received higher revenues from the Anglo-Iranian Oil Co. than the Iranian Treasury. It was claimed that this represented an inequitable distribution of the company's tax burden because its major source of earnings was its concession in Iran.

Most qualified observers who have analyzed the situation believe that it can be virtually taken for granted that, if the United States took action to raise its tax revenues from oil operations abroad, foreign governments would exercise their authority to impose correspondingly higher income taxes. U. S. tax revenues therefore would not be increased, because of the income tax credits applicable to foreign earnings. However, the tax burden of U. S. companies operating abroad would be increased as a result of the U. S. Government's action.

The Treasury Department has analyzed the effects which a denial of percentage depletion to foreign production might have. One of its officials has stated that the Department concluded:

"There is no statistical basis for precise assumptions as to possible changes but it seems probable that the apparent increase in revenue from foreign production would, in fact, be largely offset by increased foreign tax credits and that, accordingly, any net gain in revenue would be a minor fraction of these amounts."[4]

Another statement referring to this likelihood was made during a debate on the subject in the U. S. Senate in 1957:

"Let me explain, for the benefit of the author of the amendment and other Senators present, that Senators . . . ought to educate themselves on the foreign-tax credit, because until they do so, they will not understand that increasing the United States tax liability of American corporations doing business overseas in the fashion proposed will not increase the revenues of the Federal Government by 5 cents.

"If taxes are increased on American corporations doing business overseas, all that will be accomplished will be the encouragement to foreign countries to increase the same tax. If by legislation we take away the 27.5% depletion allowance and reduce it to 15%, the foreign countries will do the same thing. Then what will be accomplished? We might give Ibn Saud another $4 million or $5 million a year, or maybe $10 million; and we might give a few million dollars a year to Venezuela. This would be at the expense of the stockholders of the American oil and gas companies.

"Mr. President, if the desire is to increase foreign aid, I submit it ought to be done as a matter of national foreign policy and not just as a matter of inadvertence in an unsuccessful and ineffectual attempt to increase United States revenues."[5]

In view of the desire of foreign countries to determine the tax burden over companies operating in their territories, these statements appear to represent a reasonable appraisal of the effects which a removal of percentage depletion from foreign oil production would have. At best, such action would not yield additional U. S. taxes. And, indirectly, it would probably reduce U. S. revenues from foreign oil operations, since the additional foreign tax burden could well lower the earnings of companies engaged in such operations and, thus, the dividend payments to their U. S. owners, which are, of course, fully taxable.

These dividend payments are of considerable magnitude. Aramco, for instance, paid over $300 million in 1956 to its four U. S. parent companies. The total U. S. income tax on this amount—both from the parent companies and their individual stockholders—was estimated at $107 million.[6] In the absence of the depletion allowance these dividends would have been $63 million less and the U. S. tax payments on them would probably have declined by $22 million, according to Congressional testimony. There would, of course, also be an incalculable secondary effect from a reduction in foreign oil dividends, in the form of lower domestic purchases of oil companies, and lower exports of oil equipment. In turn, all of these would tend to reduce profits and taxes of still more businesses.

Tax Incentives for Foreign Investment. A denial of percentage of depletion to companies producing crude oil abroad would also introduce into the tax system discriminatory treatment against foreign operations of U. S. companies. This would be in contrast to traditional U. S. tax policy which has been based on the non-discriminatory application of laws and regulations. Furthermore, it would contradict current policy attempts to encourage foreign investment by American industry.

For some time, the Administration and certain Congressional Committees have been studying the most equitable and effective way to provide tax incentives to encourage overseas investments. Most proposals that have been advanced for this purpose are incorporated in a bill sponsored by Repre-

(Continued on page 80)

"No fundamental changes have occurred in the underlying forces which have made the oil industry a good bet for the long pull. Increased populations, increasing living standards, increased industrialization will make it necessary for the free world industry to provide in 1975 something in the order of 14,000,000 barrels a day more oil than were consumed in 1958. This means that by 1975 world oil demand will have increased by about thirteen times Saudi Arabia's current output."—M. J. Rathbone, President

ESSO

Standard Oil Company (New Jersey)

and affiliated companies

World Petroleum Statistics

FREE WORLD SUPPLY AND DEMAND, CRUDE AND PRODUCTS, MARCH 1959
(Thousands of barrels)

Country	CRUDE PETROLEUM					REFINED PRODUCTS			
	Production	Imports	Exports and reexports	Stock change, other demand, and loss	Total 1/ refinery input / Total 2/ refinery output	Imports	Exports and reexports	Apparent domestic demand (incl. bunkers)	Bunkers-all flags (as reported)
NORTH AMERICA									
Canada	15,866	4,959	2,774	-116	23,377	1,009	185	3/22,982	
Mexico	8,332	-	-	-68	7,186	683	1,847	8,022	64
United States (incl. Alaska)	222,834	428,113	178	-3,648	269,000	40,638	7,937	3/304,148	6,742
Subtotal	247,032	38,072	2,952	-3,832	301,563	42,330	9,529	335,152	
CENTRAL AMERICA AND CARIBBEAN									
Costa Rica	-	-	-	-	-	E/113	-	113	
Cuba	18	2,096	-	+12	2,102	E/1,182	-	3,284	
Dominican Republic	-	-	-	-	-	E/245	-	245	
El Salvador	-	-	-	-	-	E/144	-	144	
Guatemala	-	-	-	-	-	E/249	-	249	
Haiti	-	-	-	-	-	E/49	-	49	
Jamaica	-	-	-	-	-	310	-	310	
Nicaragua	-	-	-	-	-	E/90	-	90	
Panama, Canal Zone	-	-	-	-	-	E/559	E/173	386	384
Panama, Republic	-	-	-	-	-	E/173	-	173	
Puerto Rico	-	1,234	-	+426	1,608	E/164	538	1,180	
Subtotal	18	4,030	-	+438	3,710	3,278	765	6,223	
SOUTH AMERICA									
Argentina	3,759	3,265	-	+331	6,694	902	-	3/6,982	168
Bolivia	257	-	111	-22	168	10	1	177	
Brazil	1,646	2,805	380	-228	4,299	E/3,365	-	7,664	
Chile	515	307	-	+25	797	E/595	-	1,392	
Colombia	4,365	-	2,375	-66	2,111	-	340	1,771	
Ecuador	243	-	-	+45	198	71	-	269	
Netherlands Antilles	-	24,112	-	E/-988	E/27,000	E/3,574	E/22,108	8,466	
Paraguay	-	-	-	-	-	E/48	-	48	
Peru	1,477	-	276	-159	1,376	-	31	1,345	24
Trinidad	3,391	2,349	-	-207	5,990	E/233	4,030	2,193	1,198
Uruguay	-	673	-	-17	690	50	-	740	
Venezuela	91,778	-	54,251	+844	26,152	E/47	E/20,774	3/4,875	1,805
Subtotal	107,438	33,511	57,093	-441	75,475	8,895	47,284	35,922	
WESTERN EUROPE									
Austria	1,429	E/150	E/600	-122	1,101	426	133	1,394	
Belgium and Luxembourg	-	5,861	-	-20	4,907	1,918	1,884	4,941	
Denmark	-	73	-	+54	19	2,465	11	2,473	103
Finland	-	291	-	-309	E/600	921	-	1,521	
France	885	18,118	-	+702	18,301	976	4,146	15,131	
Germany, West	3,036	7,610	-	-2,411	13,057	3,585	1,459	15,183	
Greece	-	912	-	-163	1,075	191	-	1,266	
Iceland	-	-	-	-	-	114	-	114	
Ireland	-	-	-	-	-	791	-	791	
Italy	1,056	14,435	-	-259	15,827	241	5,887	10,181	
Netherlands	1,057	7,578	-	-1,655	E/10,700	3,305	5,587	8,418	711
Norway	-	-	-	-43	43	1,811	-	1,854	
Portugal	-	352	-	-578	40	333	79	1,194	
Spain	-	2,639	-	+350	2,336	42	-	2,378	
Sweden	-	E/900	-	-900	E/1,200	4,597	25	5,772	
Switzerland	-	-	-	-	-	1,404	-	1,404	
United Kingdom	91	23,378	-	-223	23,552	9,733	5,361	3/24,352	2,130
Yugoslavia	333	420	-	+52	704	50	151	600	
Subtotal	7,857	81,727	600	-4,915	84,459	32,903	24,723	98,987	
MIDDLE EAST									
Aden	-	2,481	-	+3	E/2,478	977	1,309	2,146	2,233
Bahrain	1,399	5,261	-	-65	6,725	-	5,089	1,636	317
Iran	30,280	-	19,735	-805	E/11,350	-	8,432	2,918	
Iraq	24,499	-	E/23,520	-221	E/1,200	E/10	-	1,210	
Israel	62	E/700	-	-38	800	E/297	-	1,097	
Jordan	-	-	-	-	-	E/97	-	97	
Kuwait	42,228	-	37,587	+46	4,595	104	2,309	2,390	1,575
Lebanon	-	E/545	-	-	E/545	E/23	-	3/398	E/67
Neutral Zone	3,426	-	E/2,000	+626	E/800	-	E/590	210	
Qatar	5,465	-	E/5,465	-	-	-	-	-	
Saudi Arabia	35,966	-	28,488	+699	6,259	8	4,936	1,331	
Turkey	197	-	-	-23	220	E/464	-	684	
U.A.R., Syria	-	-	-	-	-	410	-	410	
Subtotal	143,502	8,987	117,295	+222	34,972	2,390	22,665	14,527	
AFRICA									
Algeria	367	-	240	+77	-	796	-	3/756	207
Angola	25	-	-	-10	E/35	113	-	148	
Belgian Congo	-	-	-	-	-	E/226	-	226	
Canary Islands	-	1,581	-	-189	1,883	50	219	1,714	
Ethiopia	-	-	-	-	-	E/72	-	72	
States formerly in French Equatorial Africa	422	-	E/422	-	-	E/156	-	156	
French West Africa	-	-	-	-	-	E/339	-	339	
Ghana	-	-	-	-	-	E/264	-	264	
Kenya	-	-	-	-	-	496	106	390	
Liberia	-	-	-	-	-	E/32	-	32	
Madagascar	-	-	-	-	-	62	-	62	
Morocco	55	E/60	-	-2	117	300	-	417	
Nigeria	205	-	E/205	-	-	564	-	564	
Rhodesia & Nyasaland	-	-	-	-	-	E/326	-	326	
Sudan	-	-	-	-	-	247	-	247	
Tanganyika	-	-	-	-	-	238	30	208	
Tunisia	-	-	-	-	-	299	-	299	
Uganda	-	-	-	-	-	100	14	86	
Union of South Africa	-	632	-	-160	792	1,712	75	2,429	
U.A.R., Egypt	1,860	E/400	E/850	-100	E/2,300	E/830	E/18	3,212	
Subtotal	2,934	3,173	1,767	-654	5,127	6,972	452	11,947	
SOUTH ASIA, FAR EAST, AND OCEANIA									
Australia	-	5,166	-	+284	4,918	963	911	4,970	
British Borneo	3,317	-	1,850	+117	E/1,350	E/45	E/1,201	194	E/91
Burma	287	-	-	-193	E/480	E/57	-	537	
Ceylon	-	-	-	-	-	397	-	397	
India	284	E/2,700	-	-136	E/3,100	2,295	9	5,386	
Indonesia	10,540	E/2,100	5,437	-37	E/7,900	E/134	E/4,801	3/2,627	380
Japan	327	11,259	-	+667	10,819	1,475	150	12,144	
Korea, South	-	-	-	-	-	31	-	31	
Malaya and Singapore	-	128	45	+93	-	3,430	884	2,546	
Netherlands New Guinea	150	-	150	-	-	-	-	-	
New Caledonia	-	-	-	-	-	E/31	-	31	
New Zealand	-	-	-	-	-	2,901	-	2,901	
Pakistan	181	-	-	-	181	E/1,070	-	1,253	
Philippines	-	993	-	+160	831	E/562	-	1,393	
Thailand	-	-	-	-	-	740	24	716	
Taiwan	1	527	-	+72	513	459	-	978	
Vietnam, South (includes Cambodia)	-	-	-	-	-	E/247	-	247	
Subtotal	14,969	22,243	7,482	+366	30,000	14,837	7,980	36,351	
WORLD TOTAL EXCLUDING EASTERN EUROPE, U.S.S.R., & MAINLAND CHINA	523,765	192,443	198,136	-8,246	945,306	111,665	113,208	538,789	

E/ Estimate based on latest available data.
1/ Total input includes crude runs to stills plus runs of other unfinished oils, topped crude and natural gas liquids blended.
2/ Total output includes refined product output plus refinery fuel and loss.
3/ Domestic demand as reported, including stock changes.

WORLD PRODUCTION of 523,765,000 bbl of crude petroleum in March, 1959, was slightly above the February level and 13% greater than in March of a year ago (percentage changes are based on daily averages), according to the latest mineral industry survey of the USA Bureau of Mines, Division of Petroleum; Branch of Petroleum Economics.

The figures on world totals exclude the USSR, mainland China, and countries in eastern Europe except Yugoslavia. The accompanying table was prepared by the Mines Bureau.

About 43% of production in March was in the USA, 18% in Venezuela, 27% in the Middle East, with the remaining 12% distributed throughout the rest of the world. USA crude output in March was 15% over the same month in 1958; Venezuelan output was 19% greater; and the Middle East 8% above March, 1958. Increased crude output in major producing areas during the 12-month period reflected the recovery from the effects of the economic recession of 1957-58, and the rising trend of world oil demand.

World crude imports, and exports and reexports, in March were 192,443,000 bbl and 198,194,000 bbl, respectively. This was about 2% below world movements in February. There were reports of declines in shipments from Venezuela, and in receipts by the USA and western Europe.

World refined product output of 545,306,000 bbl was 2% below February. Runs to stills declined 3% in the USA, 4% in the South American area, and 4% in western Europe. Increases in runs of 7% in the Middle East, and 5% in the South Asia, Far East, and Oceania area, failed to offset the decline in other areas.

World imports of refined products were 111,665,000 bbl, while exports and reexports were 113,208,000 bbl. This was approximately equal to world movements during February.

World refined product demand in March was 538,789,000 bbl. This was 4% below the previous month. The principal factor in this drop was a seasonal decline of 5% in the USA demand during the month.

The data in the accompanying table, as well as further details given in the complete Mines Bureau report, represent an expansion in the scope of these reports, which was started in the summary for January, 1959. In addition to the previous reporting of crude production, refinery throughput, movements of crude petroleum, and output of major refined products, the Bureau has added country data on total input and output at refineries, movements of refined products, and domestic demand for products. The number of countries covered was also expanded from 52 to 93. The USSR, countries in eastern Europe, and mainland China, are excluded because no regular monthly data are available from those areas.

There is an average time lag of five to six months before data are available from enough countries to provide a reasonable indication of world supply and demand. Even after such an interval, some country data are still partly or entirely lacking. Countries in this category are prefaced with an "E" in the table, indicating that the data shown are estimates based on partial data for that month, or on the most recent month or period reported.

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Types and Performance Data

Type	No. of cylinders / Arrangement	Output P.S. (DIN)	Speedrange R. P. M.	Cyl. Bore ins.	Stroke ins.	Piston displacement cu. ins.	Weight approx. lbs.
M 202 B	2 / S	35— 55	750—1200	5 1/2	8 1/4	394.8	1665
M 203 B	3 / S	54— 96	750—1200	5 1/2	8 1/4	591.9	2150
M 204 B	4 / S	72— 126	750—1200	5 1/2	8 1/4	789.0	2715
OM 636	4 / S	17— 35	1500—3000	2 15/16	3 15/16	107.8	495
OM 312	6 / S	47— 77	1500—2400	3 9/16	4 3/4	279.5	990
OM 321	6 / S	55— 94	1500—2600	3 3/4	4 3/4	311.2	1025
OM 315	6 / S	80— 124	1200—1800	4 1/16	5 1/2	505.0	1875
OM 326	6 / S	97— 155	1200—1800	5 3/64	5 1/2	660.0	1720
MB 846 A	6 / S	114— 250	750—1500	5 7/8	7 1/2	1230.2	3860
MB 846 B	6 / L	114— 250	750—1500	5 7/8	7 1/2	1230.2	3970
MB 846 Ab[1]	6 / S	148— 320	750—1500	5 7/8	7 1/2	1230.2	4080
MB 846 Bb[1]	6 / L	148— 320	750—1500	5 7/8	7 1/2	1230.2	4200
MB 846 Ad[2]	6 / S	148— 320	750—1500	5 7/8	7 1/2	1230.2	4200
MB 836 B	6 / S	230— 350	1000—1500	6 7/8	8 1/16	1806.3	4380
MB 836 Bb[1]	6 / S	305— 500	1000—1500	6 7/8	8 1/16	1806.3	4830
MB 836 Db[3]	6 / S	370— 650	1000—1500	6 7/8	8 1/16	1806.3	5050
MB 820 B	12 / SV	460— 700	1000—1500	6 7/8	8 1/16	3612.6	6180
MB 820 Bb[1]	12 / SV	610—1000	1000—1500	6 7/8	8 1/16	3612.6	6900
MB 820 Db[3]	12 / SV	770—1350	1000—1500	6 7/8	8 1/16	3612.6	7240
MB 837 A	8 / SV	165— 440	850—2000	6 1/2	6 7/8	1825	2940
MB 837 Aa[1]	8 / SV	240— 550	850—2000	6 1/2	6 7/8	1825	3020
MB 839 Ab[1]	16 / SV	1145—1800	1000—1500	7 1/2	9 1/16	6380	11020
MB 839 Bb[3]	16 / SV	1380—2350	1000—1500	7 1/2	9 1/16	6380	11450
MB 518 [1]	20 / SV	3000	1720	7 5/16	9 13/16	8201.5	10550

S = vertical; L = horizontal; V = vee type; [1] = supercharged; [2] = supercharged and with boost intercooling
[3] = with high boosting and boost intercooling.

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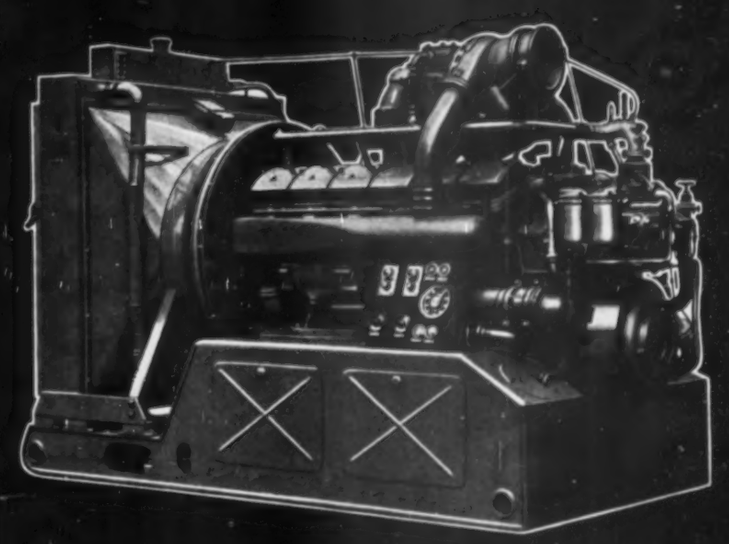

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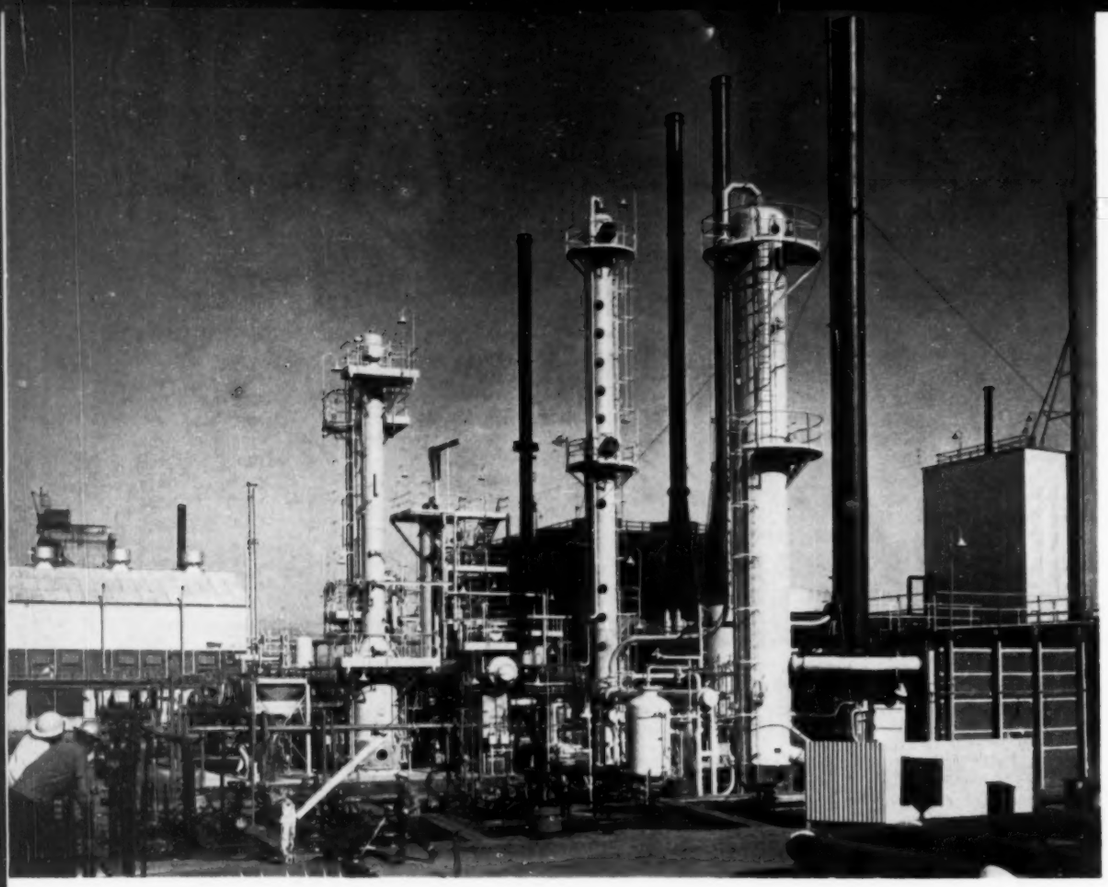


The commercial size Isocracking unit now in operation at California Standard's Richmond refinery.

Isocracking — Cal Research's new process

A low temperature, catalytic hydrocracking process, it has applications including octane improvement, fuel oil reduction, paraffin-to-isoparaffin conversions, and conversion of coker distillates to catalytic reforming feed

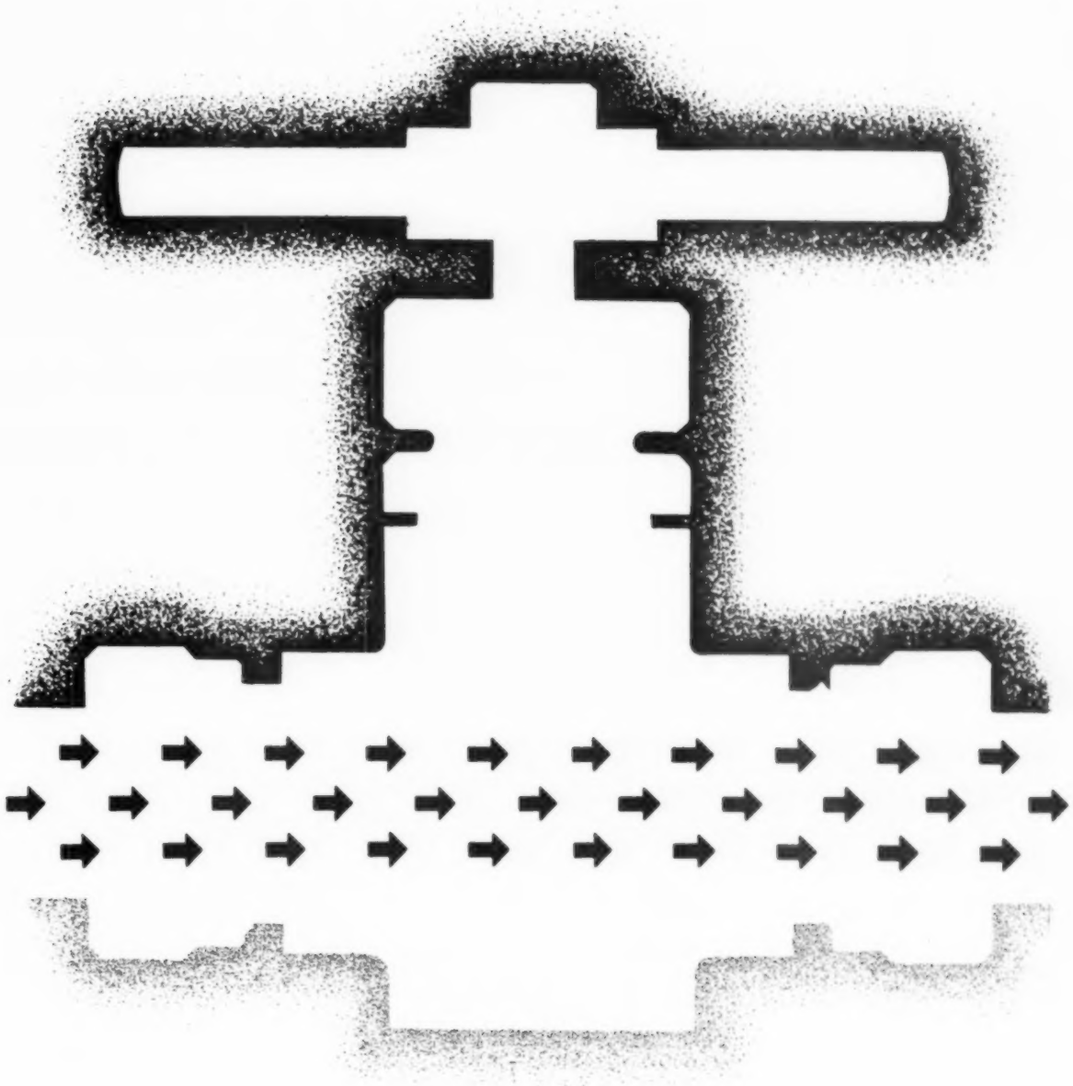
A NEW CATALYTIC PROCESS for hydrocracking distillates at low temperature and relatively low pressure, trade-named "Isocracking," has been brought to commercial development by California Research Corp., research subsidiary of Standard Oil Co. of California.

Full scale operation of the process started this year at Cal Standard's Richmond refinery in a unit of approximately 1,000 b/d capacity, following over 100,000 hours of pilot plant work, which included the preparation and testing of some 1,000 different catalysts of various descriptions.

Isocracking makes it economically feasible to hydrocrack refractory distillate stocks to very high octane number gasoline components. Typical feeds are heavy cracked naphthas, light cycle oils, and coker distillates. A typical product is gasoline blend stock, which after moderate severity catalytic reforming, has a research octane rating of 103-105 F-1, with 3 ml of TEL.

Yields generally exceed 100 vol-%. Additionally, a substantial volume of isobutane is produced. This yield structure is unusual in comparison to the low yields from severe processing required to reach these octane levels with other methods.

Economics of the new process are attractive, in that it employs conventional equipment and operates at moderate conditions. The on-plot cost of an Isocracker is estimated to range from $350 to $450 per daily bbl of reactor feed. The plant will operate with a high per-pass conversion, in the range of 50 to 70%. Operating costs are reported comparable to those for a two-stage catalytic reformer, and economic studies show that



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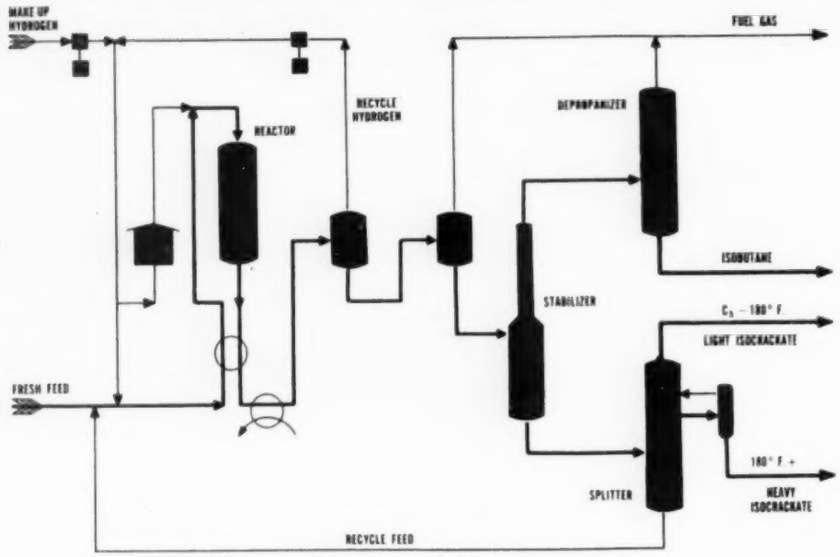

Fig. 1—Flow diagram of Isocracking process
Reaction conditions are 400-700 F and 500-2000 psig

an Isocracker installation will often pay out, before taxes, in less than two years. If reformer hydrogen is not available, the installation of an additional hydrogen manufacturing unit adds about six months to the pay-out period.

Major functional equipment in an Isocracker, shown in the flow diagram in Fig. 1, includes the reactor, feed-reaction mix exchange, hydrogen furnace, recycle and hydrogen makeup compressors, and the appropriate fractionation facilities to recover products and recycle feed as it is needed.

Normal operation is at a conversion of 50 to 70% per pass, with total recycle of materials boiling higher than the desired gasoline end point. Principal construction material is carbon steel because of the relatively moderate operating conditions. Low chrome-moly alloy steel is used only in portions of the reactor system.

Details on the catalyst have not been disclosed. The company states it is a rugged, long life catalyst with extremely high activity and selectivity, and that it costs much less than conventional noble metal reforming or isomerization catalysts.

Typical feed stock and products yields data are given in Table I. Liquid yields are high; typically 115 vol-% of butane+ material. Very low methane and ethane fuel gas yields, and higher-than-equilibrium proportions of isoparaffins in the butane and pentane fractions are characteristic.

The entire liquid product can be used for gasoline blending. However, it is generally preferable to split the product into light "Isocrackate" (C_5 to about 180 F) and heavy Isocrackate fractions, as shown in Table I. The end point of the heavy product can be controlled through operation of the recycle splitter column. Selection of the splitter cut point will depend generally upon the refinery gasoline pool volatility requirements.

Light Isocrackates are desirable blending stocks. They have low sensitivity and desirable high road octane ratings because their light isoparaffins are higher than equilibrium concentration. The heavy Isocrackates (180 F+) are attractive as catalytic reforming feeds. Because of their relatively high octane number, coupled with their high ring content, they reform to 105-108 F-1 leaded (3 ml) at moderate reforming severity.

Reformed Isocrackates run consistently about three octane numbers higher at a given reforming yield than products from usual commercial reformer feeds of the same octane and same hydrocarbon class compound analysis.

Distribution of the paraffins, naphthenes and aromatics in the product is shown in

TABLE 1—Isocracking Feed and Product Inspections

Typical Feed Stocks	Hvy Cracked Naphtha	Catalytic Cycle Oil
API Gravity	36.7	31.0
ASTM D86 or D158, °F:		
5%	372	415
10%	376	430
50%	383	478
90%	405	523
EP	450	570
Paraffins, liq. vol-%	25	5
Naphthenes, liq. vol-%	32	46
Aromatics, liq. vol-%	43	49
Octane, F-1 @ 3ml TEL	80.7	—

Typical Product Yields	Wt-%	LV-%	Wt-%	LV-%
C_1	0.01		0.01	
C_2	0.6		0.1	
C_3	3.6		1.7	
Iso butane	9.4	14.0	4.5	7.0
n-butane	4.0	5.8	2.8	4.2
C_4+Isocrackate	84.8	94.0	93.4	105.4
C_5+Isocrackate	98.2	113.8	100.7	116.6
Gasoline Stocks	**C5-180F**	**180-360F**	**C5-180F**	**180-400F**
Yield, Vol-% C_5+	28	72	23	77
API Gravity	81.7	46.1	82.0	44.3
Octane F-1 @ 3ml TEL	100	94.6	100	93.8
Octane F-2 @ 3ml TEL	100.6		100.6	
Octane F-1 @ 3ml TEL*		104.8		104.5
Paraffins, LV%	81	22	84	23
Naphthenes, LV%	16	38	13	36
Aromatics, LV%	3	40	3	41

* After platinum reforming to 91 vol-% C_5+.

TABLE 2—Isocracking Heavy Naphtha for Premium Grade Gasoline Quality Improvement

(Basis: 100,000 b/d California refinery; constant volume gasoline output)

	Base Case	Case 1	Case 2	Case 3
Isocracker Size, b/d	—	1,400	2,800	4,200
Premium grade (50%):				
F-1 @ 3ml TEL	100.3	101.4	102.0	102.2
ASTM 90%, °F	340	340	328	325
Regular grade (50%):				
F-1 @ 3ml TEL	94.4	93.9	93.8	93.9
ASTM 90%, °F	365	352	333	327

TABLE 3—Isocracking Catalytic Cycle Oil for Fuel Oil Reduction

(Basis: Average California refinery; constant gasoline volume and octane, constant bunker fuel viscosity, 190 SSF @ 112F)

	Base Case	Case A	Case B	Case C
Processing added, b/d:				
Isocracking	—	3,700	3,700	3,700
Coker	—	—	6,000	—
Tar Stripper	—	—	—	10,300
Crude input, b/d	100,000	97,250	92,000	90,500
Product changes, b/d:				
Fuel oil reduction	—	2,690	8,570	9,850
Coke production, ton/day	—	—	175	—
Butane purchase, b/d:				
Isobutane	+380	−90	+55	+75
n-butane	+275	−100	+40	+60

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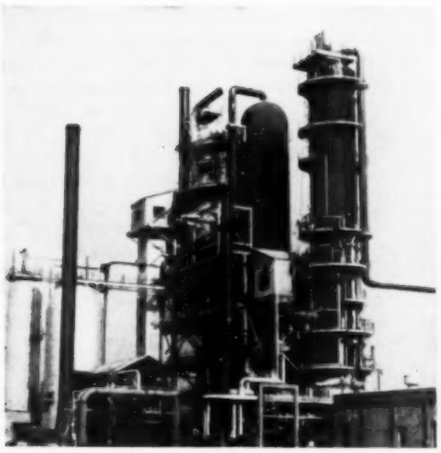

Montreal refinery. Regenerator towers gunited

Kwinana refinery. Towers gunited

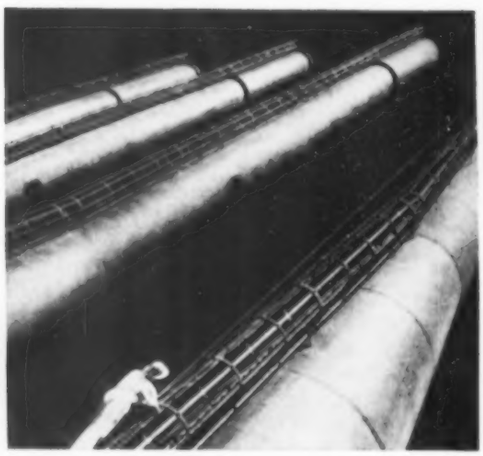

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TABLE 4—Economics for 7,000 BPOD Isocracking Units

(90% Stream Efficiency)

	Hvy. Naphtha		Lt. Cycle Oil	
	Use of Existing Catalytic Reformer	New Cat. Reformer	By Product H_2 Available	H_2 Unit Required
Plant investment, $ million:				
H_2 manufacture	—	—	—	2.4
Hydrogenation	—	1.5	1.9	1.9
Isocracking	4.6	4.1	5.3	5.3
Reforming	—	2.0	2.3	2.3
Total	4.6	7.6	9.5	11.9
Feed costs, $ /cd:				
Hvy naphtha @ $4/bbl	25,200	25,200	—	—
Lt. cycle oil @ $3/bbl	—	—	18,900	18,900
H_2 @ $2/bbl EFO	1,120	1,120	1,200	380[1]
TEL @ $2.20/liter	1,580	1,580	1,810	1,810
Subtotal	27,900	27,900	21,910	21,090
Operating costs, $/cd:				
H_2 plant[2]	—	—	—	2,900
Hydrogenation	1,380[3]	970	1,150	1,150
Isocracking	3,700	3,090	4,010	4,010
Reforming	2,090[4]	1,540	1,750	1,750
Subtotal	7,170	5,600	6,910	9,810
Total Mfg. cost $/cd	35,070	33,500	28,820	30,900
Product realization, $/cd:				
Fuel gas @ $2/EFO-bbl	1,050	1,050	800	800
Isobutane @ $4/bbl	3,530	3,530	2,070	2,070
n-butane @ $2.70/bbl	730	730	10	10
Gasoline, 10 lb. RVP-3ml TEL:				
103.2 F-1 @ $7/bbl	39,860	39,860	—	—
103.5 F-1 @ $7.10/bbl	—	—	46,370	46,370
Total	45,170	45,170	49,250	49,250
Amount available for payout, $/cd	10,100	12,670	20,430	18,350
Pay-out, years, before taxes	1.3	1.8	1.3	1.8

[1] Hydrogen from platinum reformer
[2] Includes feed stock cost to hydrogen plant.
[3] Includes $410/cd depreciation for existing facilities.
[4] Includes $550/cd depreciation for existing facilities.

Fig. 2. The different classes are distributed through the boiling range different than the usual catalytic reformer feeds. The isoparaffins dominate in the lower boiling ranges, where the octane numbers of this class of hydrocarbons are highest. The naphthenes accumulate in the desirable C_7-C_8 molecular weight range. Therefore, reforming leads to production of toluene and xylene, the highest octane number aromatics.

The initial refinery applications for the process are expected to be octane improvement and fuel oil reduction.

The effect of Isocracking on premium grade gasoline quality improvement is illustrated in Table 2. Cases 1-3 show the increased octane and volatility produced with successively larger increments of hydrocracking while maintaining essentially a constant gasoline volume and constant refinery crude input.

In this example, a heavy cracked naphtha, boiling too high to be included in premium gasoline, was put through Isocracking. The 180 F+ Isocrackate fraction was reformed. The high quality products from Isocracking are placed in premium grade gasoline by displacing an equivalent volume of lower octane, higher sensitivity components to regular gasoline. In effect, volatility limitations of gasoline blending are modified, and it becomes possible to move some high octane aromatic stocks from regular to premium grade gasoline.

By varying the Isocracker recycle cut point, the refinery can control volume, volatility and octane number of his gasoline according to his market demands.

Fuel oil reduction. Refineries having cutter stocks available in excess of fuel oil viscosity requirements will realize attractive benefits from the new process. It also finds application in a balanced refinery situation in which fuel oil output should be reduced.

Isocracking for fuel oil reduction is shown in Table 3. The cases shown illustrate that with light cycle oil Isocracking, both crude input and fuel oil production can be reduced while the gasoline pool volume and octane number are maintained constant. Conversely, if crude input is held constant, the octane number and volume of the gasoline pool will rise as fuel oil production is decreased. In these cases, a light catalytic cycle oil was converted to 400 F end point gasoline. The 180-400 F fraction was catalytically reformed at moderate severity to 104.5 F-1 leaded (3 ml) at 91 vol-% C_5 + yield. The combined yield of 103.5 F-1 full boiling range gasoline was 104 vol-% to the Isocracker feed.

Estimated investment and operating costs for several 7000 b/d installations are shown in Table 4. The costs are typical in situations where incremental utilities are available. If all new off-site facilities are required, total investment costs would of course be increased.

Figs. 3 and 4 chart the effects of three significant variables: plant size, feed stock costs, and product realizations. Investment pay-outs are good over a wide range of plant sizes and feed costs.

In Fig. 5 is an example of the total cost of producing 103.5 F-1 leaded (3 ml) gaso-

Fig. 2—Isocracker product composition

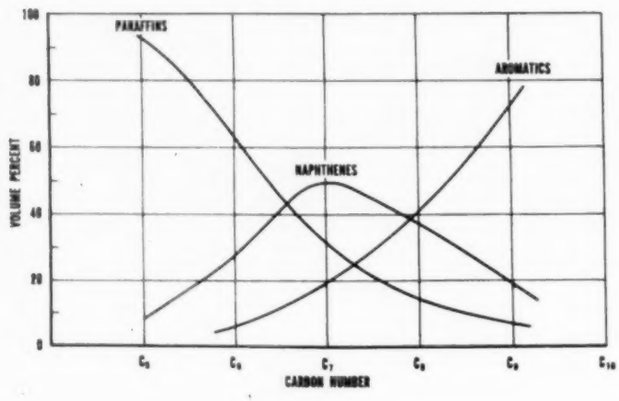
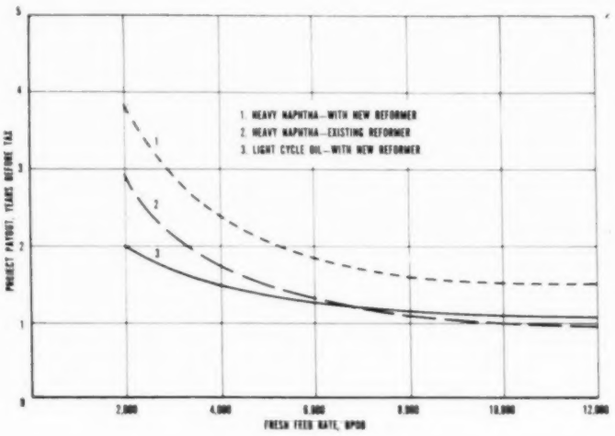


Fig. 3—Plant size versus Isocracking economics



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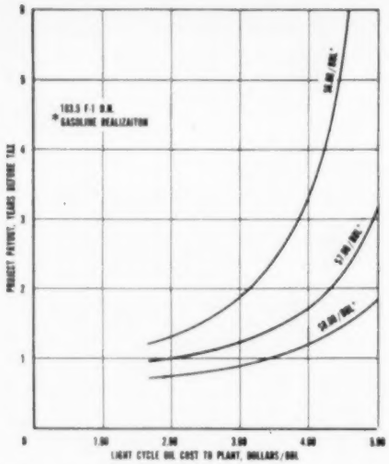


Fig. 4—Economics for Isocracking light cycle oil

line showing the pay-out of the complete investment for hydrofining, Isocracking, and catalytic reforming facilities. The investment for off-site facilities has been estimated at 30 to 35% of the on-site costs in these examples.

With reasonable realizations on gasoline product, the project can be expected to pay out in 1½ to 3 years before tax.

The unusual results from Isocracking are governed by reaction mechanism rather than by thermodynamic equilibrium limitations. For example:

(1) Light product fractions contain isoparaffins in production which are far on the isoside of thermodynamic equilibrium.

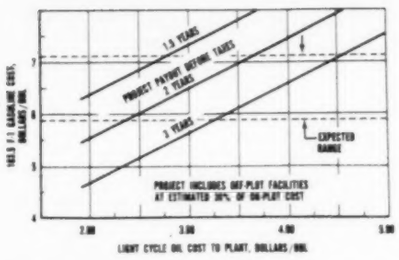
(2) Heavy aromatics are cracked without substantial saturation or loss of ring structure.

(3) Aromatics are demethylated without production of methane.

(4) Heavy naphthenes are cracked without appreciable loss of ring structure, and characteristically yield naphthenes in the C_7-C_8 boiling range.

(5) Naphtha fractions are produced which can be catalytically reformed to the 104-108 octane level in high yields and at moderate severity.

The reaction mechanism in the process makes for some strange bedfellows among the products. Butane and pentane fractions contain isoparaffins in proportions to be expected from an isomerization process operating near room temperature. On the other hand, the methyl cyclopentane-cyclohexane fraction contains the former isomer in the high proportions expected from high temperature isomerization. This unusual combination contributed heavily to the high octane number of the gasoline product.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PROJECT PAYOUT BEFORE TAXES
2 YEARS
3 YEARS
EXPECTED RANGE
PROJECT INCLUDES OFF-PLOT FACILITIES AT ESTIMATED 30% OF ON-PLOT COST
103.5 F-1 GASOLINE COST, DOLLARS/BBL
LIGHT CYCLE OIL COST TO PLANT, DOLLARS/BBL

Fig. 5—Production of 103.5 F-1 octane (3 ml TEL) gasoline

One of the most striking reactions involves polymethyl benzenes. These demethylate rapidly, but instead of forming methane, the methyl groups turn up as liquid isoparaffins.

California Research Corp. is making Isocracking available to the petroleum industry under appropriate license arrangements. Bechtel Corp., San Francisco, has been licensed to provide process design, engineering, and construction services. Bechtel built the commercial Isocracker now in operation at Richmond.

Cal Research has no immediate definite plans for further new units, but says it is giving consideration to Isocracking possibilities at other company refineries. END

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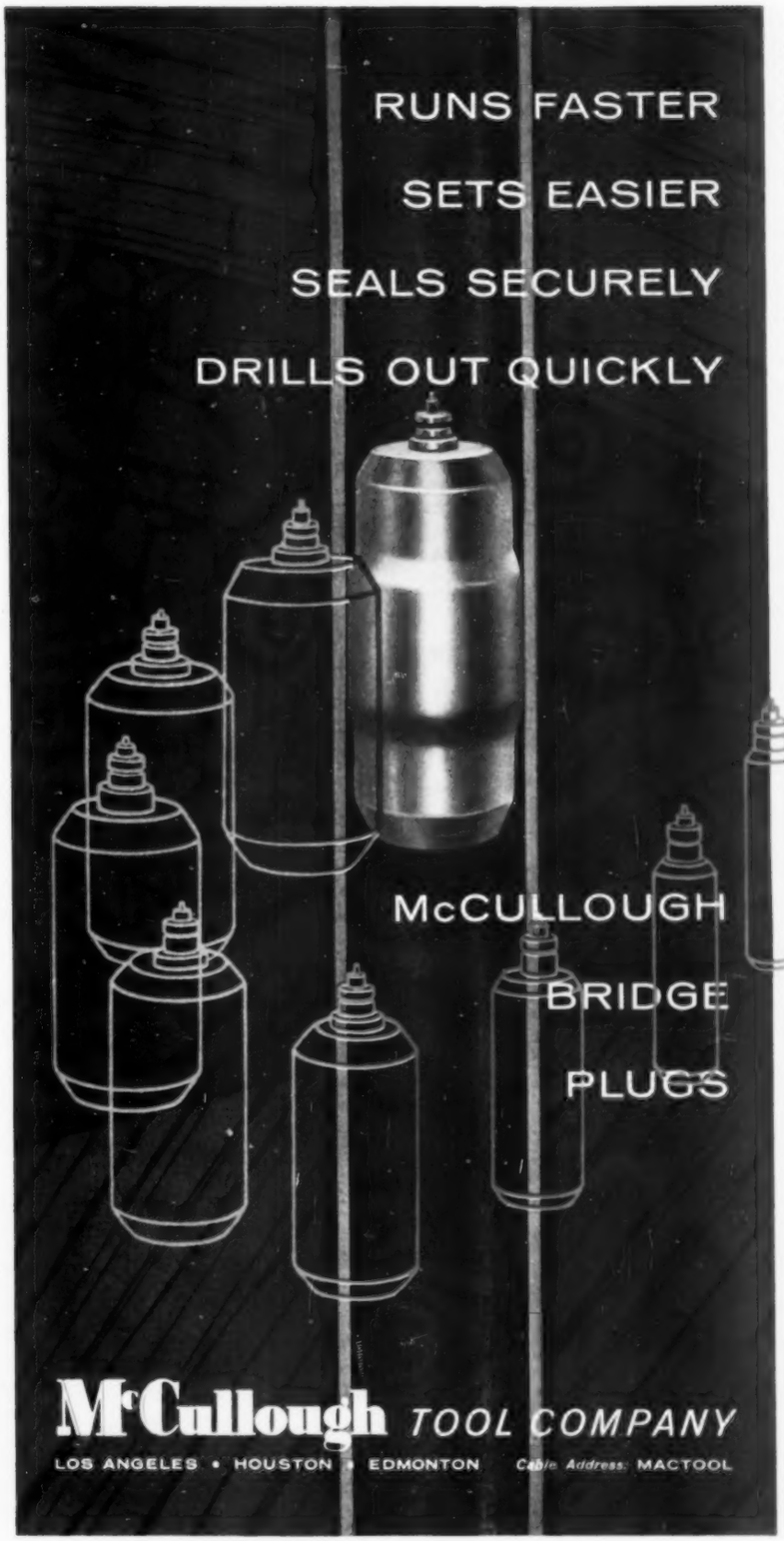

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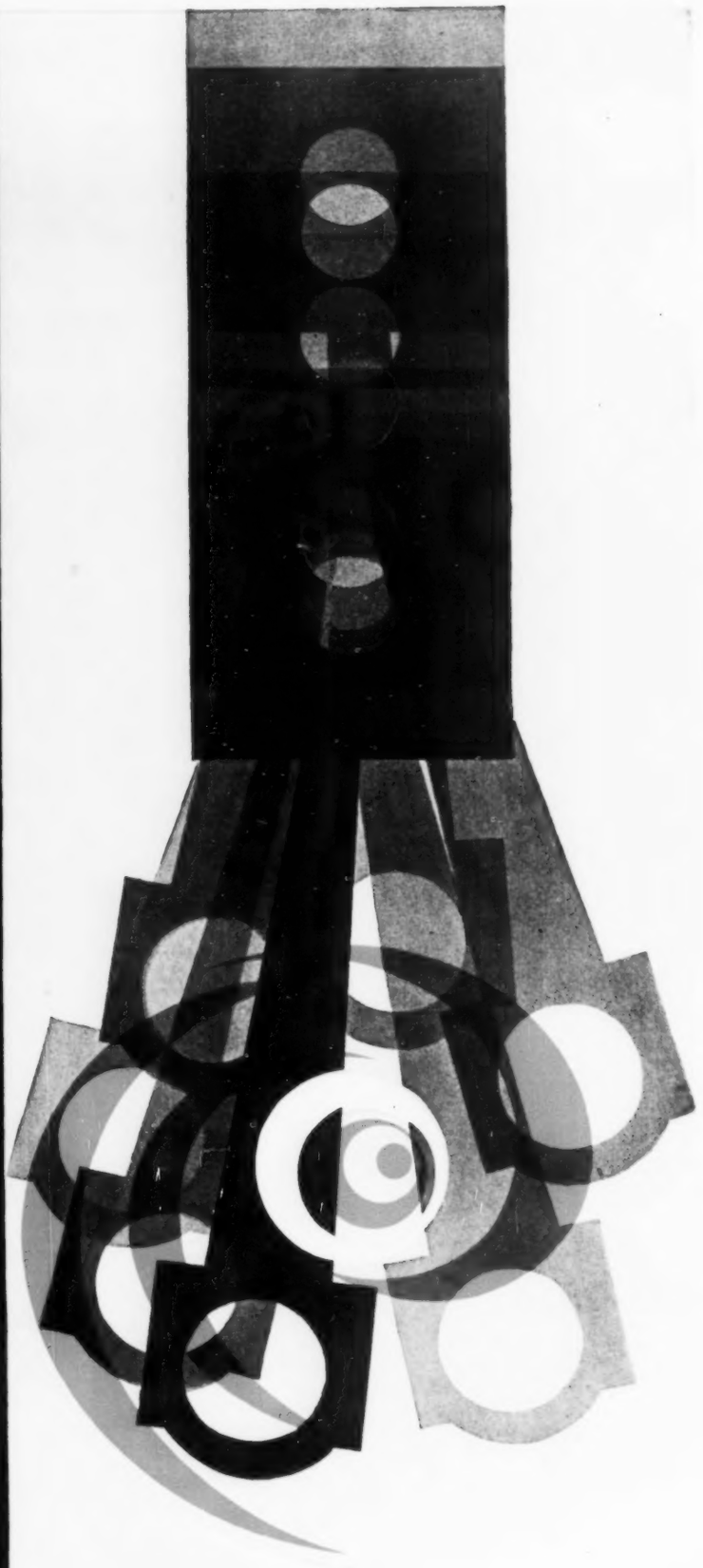
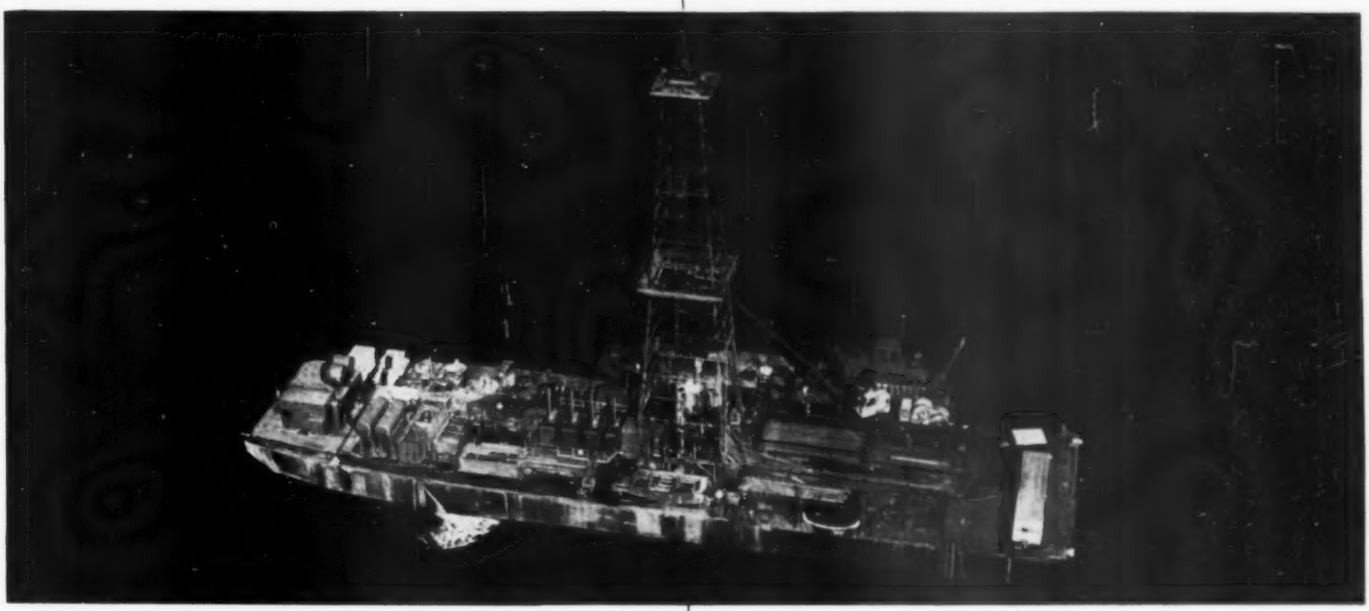


HANEY DRILLING COMPANY WILLIAMS

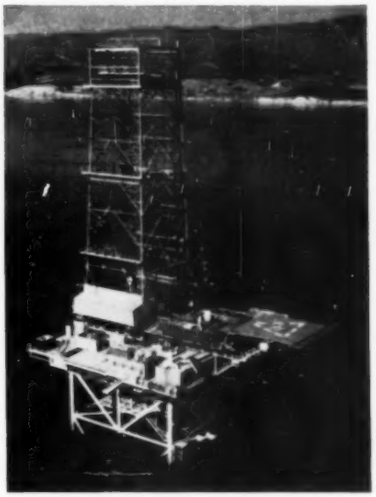
HANEY AND WILLIAMS DRILLING CO.

The parent company, Haney and Williams Drilling Co., is an organization with twenty-one years of competitive diversified experience in the California area and other parts of the Western Hemisphere.

Current operations consist of four modern rigs in California and seven projects in foreign and offshore locations.



WODECO FLOATING BARGE OFF THE CALIFORNIA COAST. OPERATOR—Phillips Petroleum Co. & Associates. BARGE—254 ft. x 68 ft. x 18 ft. steel. DERRICK—108 ft. steel designed to rack 10,000 ft., 3½ drill pipe in 60 ft. stands. DRILLING EQUIPMENT—one 12,000 ft. Diesel rig with a total of 2100 horsepower.



FIXED PLATFORM OFF THE CALIFORNIA COAST erected by Standard Oil Company of California and Humble Oil and Refining Co. PLATFORM—178 ft. platform permanently set in 100 ft. of water, 2.2 miles off the coast in open ocean (plus 147 ft. derrick). PROVISION for completion of 25 wells. DRILLING EQUIPMENT—two completely independent 12,000 ft. rigs powered by electric current from the shore.

FOREIGN OPERATIONS

The Haney and Williams organization has operated outside the Continental United States since 1950 in Mexico, Uruguay, Brazil, and Alaska. It is in a position to furnish crews, equipment and experienced supervisory personnel for drilling operations anywhere.

subsidiary companies

DUNLAP and GRAHAM DRILLING CO. INC.
Cable Address, Long Beach, Calif. and Montevideo, Uruguay: LAPGRA

HANEY-WILLIAMS DRILLING CORP. S. A.
Cable Address, Long Beach, Calif. and Maceio, Brazil: HAWDRIL

OFFSHORE OPERATIONS

WESTERN OFFSHORE DRILLING & EXPLORATION CO. WODECO

WESTERN OFFSHORE DRILLING AND EXPLORATION CO.

WODECO is an organization specializing in adaptations to marine drilling requirements on the Pacific Coast since 1956. Current operations include exploratory drilling barge "M. V. Torry" off coast of Ecuador, S. A., for California Ecuador Petroleum Company. *Cable Address,* Long Beach, Calif. and Guayaquil, Ecuador: WESDRIL

HANEY AND WILLIAMS DRILLING CO.

LONG BEACH, CALIFORNIA

U. S. Depletion Vs. International Production

(Continued from page 66)

sentative Hale Boggs, a member of the House Ways and Means Committee. A major proposal in this bill would reduce the tax rate on foreign income from 52% to 38%. This rate now applies only to businesses defined as Western Hemisphere Trade Corporations, i.e. firms which conduct all their business in this hemisphere outside the U. S., obtain 95% of their income from sources outside the United States and derive 90% of their gross income from active conduct of a trade or business. The Boggs bill would also allow tax-free transfers of assets from domestic to foreign corporations. Furthermore, it provides that special tax reductions enacted by foreign governments as incentives for investment could be regarded as taxes actually paid in calculating the U. S. tax credit.

The State Department, the Commerce Department and the Treasury have endorsed many of the principles contained in the Boggs bill. Vice-President Nixon has also endorsed the principle of creating incentives for overseas investment. In an address before the Academy of Political Science in April 1959, Mr. Nixon stated: *"We must (recognize) that the task of providing the necessary capital for investment in under-developed countries is a job too big for mere Government money. Only private money, privately managed, can do it right in many sectors of needed development. And private investment requires a sound and reliable framework of laws in which to work."*[7]

These policies are of direct concern to the investment of American companies in the petroleum industry outside the United States. This investment is by far the largest single investment abroad by American corporations. It amounted to $8,981 million at the end of 1957, the latest date for which information is available, which was equivalent to over 36% of all direct investment in foreign areas by U. S. enterprises.[8]

Any action by the United States to increase the taxation on foreign income of oil companies, such as a removal or reduction of percentage depletion, would thus have a detrimental effect on current policies aimed at encouraging investment abroad. For the singling out of the one industry with the most important overseas investment certainly could be interpreted as a conscious reversal of an important facet of American foreign economic policy.

It would also reverse a long-standing governmental policy of encouraging U. S. oil companies to venture abroad. While the government has recently found it necessary to control imports of foreign oil into the United States, it has always maintained that such imports do have an important supplementary role to play in helping to satisfy U. S. oil requirements. Government studies have shown that in the medium to long-term this role is likely to grow. An increase in the income tax burden of American companies developing oil supplies abroad would, therefore, have serious and widespread consequences, both in petroleum economics and in foreign affairs.

REFERENCES

[1] Walter W. Brudno, *Review of Considerations Arising in Foreign Oil Operations*, Ninth Annual Institute of Oil and Gas Law and Taxation, Southwestern Legal Foundation, Dallas, Texas, p. 457.

[2] Annual Report, 1958, Creole Petroleum Corporation, p. 30.

[3] *Emergency Oil Lift Program and Related Oil Problems*, Joint Hearings before Subcommittees of the Committee on the Judiciary and Committee on Interior and Insular Affairs, United States Senate, 85th Congress, 1st Session, Part 2, p. 1442.

[4] *Congressional Record*, August 11, 1958, p. 15536.

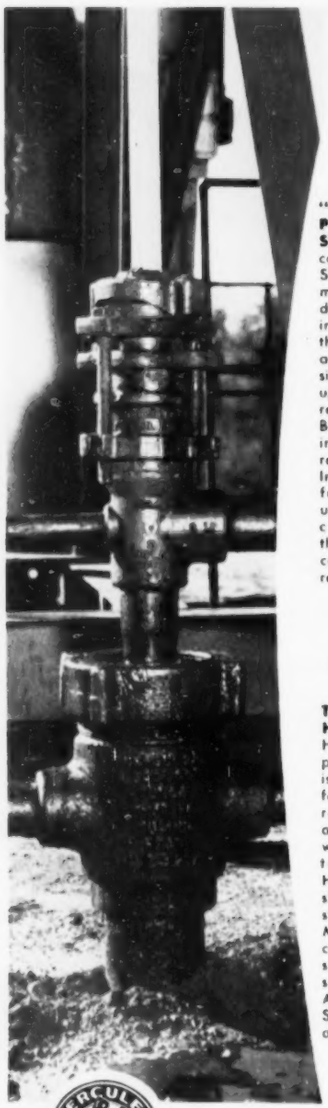
[5] *Congressional Record*, March 27, 1957, p. 3988.

[6] *Emergency Oil Lift Program and Related Problems*, op. cit. p. 1441.

[7] *The New York Times*, April 14, 1959, p. 20.

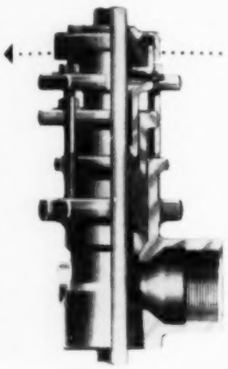
[8] *Survey of Current Business*, September 1958, p. 17.

HERCULES products in ACTION

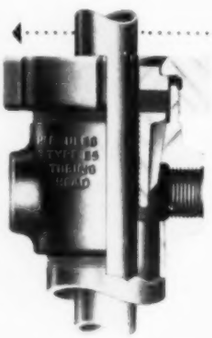


A typical set-up is shown below in Creek County, Oklahoma, using Hercules "Tee Type" Duplex Polished Rod Stuffing Box and Type "ES" Tubing Head. This is an easily assembled, effective and economical producing unit.

"TEE TYPE" DUPLEX POLISHED ROD STUFFING BOX—A combination Tee and Stuffing Box with female thread to screw directly onto the tubing, eliminating one threaded connection and resulting in a considerably shorter hook-up. With internal parts removed, the Stuffing Box body is full opening and need not be removed to pull rods. In addition to being furnished in the most used sizes, special combinations of threads and outlets can be furnished on request.



TYPE "ES" TUBING HEAD—This Tubing Head is ideal for any pumping situation. It is economical enough for shallow wells and rugged enough for any depth well, with working pressure up to 1500 pounds. Hercules self-aligning slips suspend the inner string in this Head. Mandrel suspension can be furnished instead of slips, if desired, at no extra cost. A neoprene Tubing Stripper Unit is also available.



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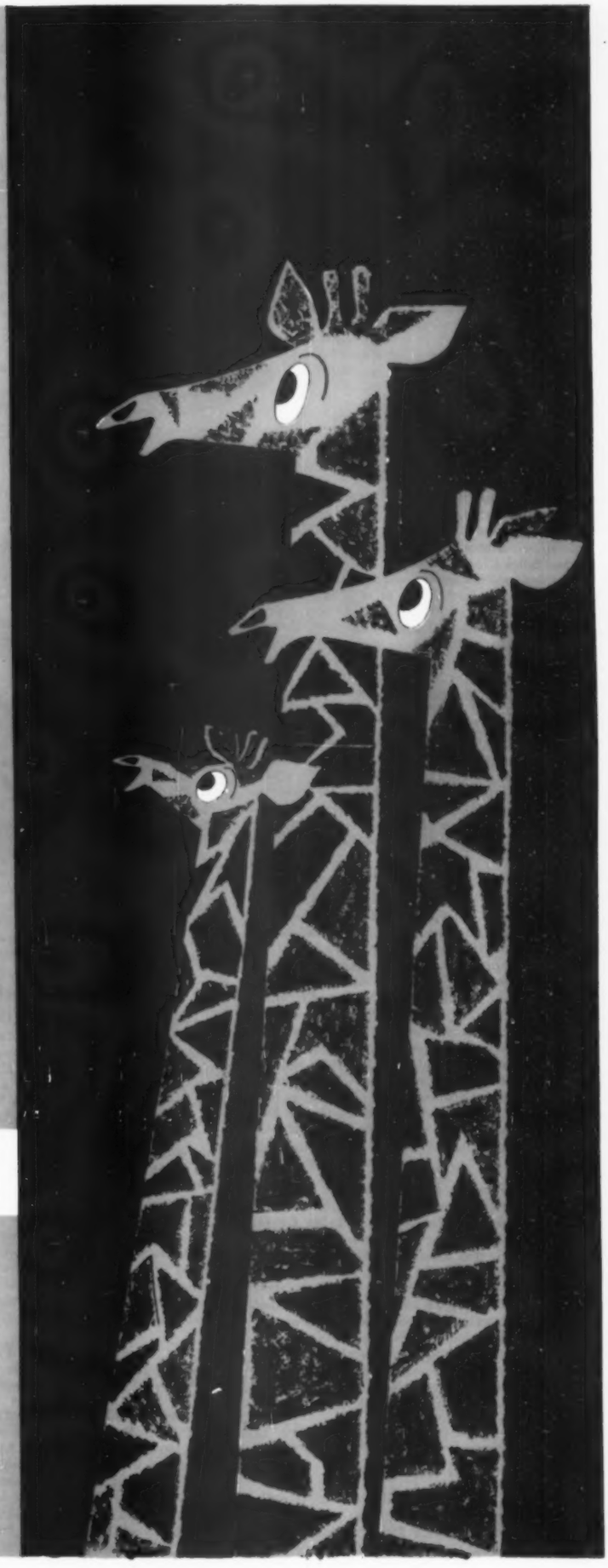

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NEW PUBLICATIONS

American Petroleum Refining, 4th Edition, by H. S. Bell, consulting engineer, is aimed at bringing up to date this valuable work, first published in 1923, with the last previous edition published in 1945. It includes information on the chemical and physical properties of hydrocarbons, the characteristics of crude oil and products, and discusses auxiliary services such as power, water, waste disposal and fire protection. Deep theory is avoided, making this book a good reference for men in other branches of the industry to gain an insight on processing. Although the book suffers some from unevenness—a few chapters are extremely detailed while others are much too general—this is still one of the best sources of a good broad picture of petroleum refining per se. And quite properly, reference is made occasionally to more detailed sources of information available in the literature. Published by D. van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J., USA. Price $12.50.

Petroleum Refinery Manual, by Henry Martyn Noel, consulting engineer. This new volume would seem to fill a gap in the current literature by providing considerable much-needed information on refinery design and construction and the standard techniques of petroleum processing today. Information given on planning and construction of new plants includes preliminary considerations, estimating, scheduling, mechanical design, shop fabrication, and field work. Tabular details are provided on manpower requirements for each phase of refinery construction, as well as figures on capital investment, operating manpower and operating costs on the various modern processes. Greater emphasis is given on the newer processes, although former methods are outlined for comparison purposes. Information is based on both large and small plants, and for both USA and foreign operations. Mr. Noel, a veteran in this field, had 31 years of experience with Standard Oil Co. (N. J.) and its affiliates. He managed the building and initial operation of his company's first large refinery in France. After World War II, Mr. Noel was on MacArthur's staff in Tokyo with the assignment to inspect all bombed Japanese refineries and set quotas for their initial operation after rehabilitation. Published by Reinhold Publishing Corp., 430 Park Avenue, New York 22, N. Y. Price $7.95.

The American Petroleum Industry, The Age of Illumination, by Harold F. Williamson and Arnold R. Daum, Northwestern University. This new book traces the growth of the USA petroleum industry from 1859 to the end of the 19th century, when the age of kerosine illumination ended and the gasoline age began. The Age of Illumination is the first of a definitive two-volume history, based on intensive research sponsored by the American Petroleum Institute. Economists, historians, students, oilmen in particular and businessmen in general—will find it an authoritative account of the industry in the USA. Included are nearly 150 maps, diagrams, and photographs that illustrate the various developments during the last half of the 19th century. Published by Northwestern University Press, Evanston, Ill. Price $7.50.

Gas Chromatography, 2nd Edition, by A. I. M. Keulemans, research chemist, Koninklijke/Shell-Laboratorium, Amsterdam, Holland; edited by C. G. Verver. This newest edition adds important advances in practical details that have occurred since the original book appeared in 1957. The most important of these are: the development, for highly critical separations, of columns having an extremely large number of theoretical plates; the introduction of new and highly sensitive detection systems; the use of gas-solid chromatography for special purposes, such as the characterization of catalyst surfaces and the separation of isotopes. A subject index has been added. Published by Reinhold Publishing Corp., 430 Park Avenue, New York 22, N. Y. Price $7.50.

Continental Net Up 22%

Net income of Continental Oil Co. and consolidated subsidiaries for the third quarter of 1959 was $16.2 million compared with $13.2 million for the third quarter of 1958, an increase of 22%. Per share earnings were 77 cents and 66 cents for the respective quarters. Net income for the first nine months of 1959 totaled $45.3 million, an increase of $11.5 million or 34% over the first nine months of 1958. Per share earnings for the first nine months of 1959 were $2.15 compared with $1.68 in the same 1958 period. Net income for both the third quarter and first nine months of this year were at all-time highs for such periods.

Net earnings for the third quarter are after a provision of $4,750,000 to a reserve for possible losses on foreign operations. For the nine months of the current year appropriations to this reserve from earnings aggregate $7,250,000 as compared with an appropriation of $1,700,000 during the corresponding period of 1958. Continental's crude oil production in the third quarter was approximately 6% more than in 1958, averaging 152,415 b/d. For the first nine months of 1959 the Company produced approximately 16% more crude oil than in 1958.

New Nuclear Lab

Socony Mobil Oil Co., Inc., has officially opened its nuclear research center at Stony Brook Farm, about five miles west of Princeton, N. J. The laboratory will be devoted to the study of chemical changes resulting from nuclear radiation. One important area of research conducted there will be the study of catalysts used in refinery processes and in petroleum chemical manufacturing.

Humble Expands Lube Facilities

Humble Oil & Refining Co. is planning a new 9,500 b/d lube oil hydrofiner and a major expansion of two existing lube plants at its Baytown Refinery. The new plant will use a catalytic hydrogen treating process to remove sulfur compounds and other impurities from lube oil feed stocks.

Plants to be expanded are a lube dewaxing plant and a lube extraction plant. Engineering work for the projects is in progress, and construction is scheduled to be completed during the latter part of 1960.

Texus to Expand R & D

Texas-U. S. Chemical Co. (Texus) has completed plans for an expansion of their research and development facilities in Parsippany, New Jersey. The main feature of this expansion is a fully-equipped, all brick two-story building.

The new laboratory will accommodate over 150 persons and will provide additional space and facilities for research and development work largely in the polymer and petrochemical fields. Sales technical service will also be expanded. Construction is slated to begin in May of 1960.

Japanese Petrochem Plant

The Furukawa Chemical Industries Co. of Tokyo has dedicated the world's first commercial plant to use the Standard Oil Co. (Indiana) process for making polyethylene and copolymer plastic. Chairman Frank O. Prior and President John E. Swearingen of Standard Oil said in a message to Koichi Tatewaki, president of the Japanese firm, that the Furukawa plant "represents final fruition of an extensive research and development effort which Standard has conducted in its laboratories for several years." Furukawa is the first foreign licensee for the process.

The new plant, using low pressure, will have a capacity of 20 million pounds per year when regular commercial operations are under way. Standard Oil, in addition to licensing its process, also prepared the basic process design for Furukawa. The plant was completed in less than a year. The Furukawa plant was designed to make both high-density polyethylene and copolymers.

Phillips Net Up 34%

Phillips Petroleum Co.'s improvements in earnings in 1959 over 1958 brought a 34% increase in profit for the first nine months of 1959 over the same period last year. Nine months earnings in 1959 were $77,386,194 compared with $57,609,292 in the same period of 1958. For the third quarter, earnings were $24,177,400 or 70 cents a share compared with $21,197,716 or 62 cents a share in the same quarter of last year, an increase of 14%. A large share of increased oil output came from Venezuela, where daily net production was at a rate of 28,000 barrels at the close of the nine months compared with an average of 8,400 barrels for 1958. Further chemical expansion reported to stockholders, to meet increasing sales requirements, included additional ethylene and ammonia capacity.

Eastman Oil Well Sold

Eastman Oil Well Survey Co. has been sold to Philip D. Arterburn of Denver, Colorado. The company, first and largest in its field, specializes in controlled directional drilling of oil wells. Mr. Arterburn, who has served the Eastman firm as financial advisor since 1943, will be the new president, with H. John Eastman continuing as chairman. The company controls Eastman International Co. of Hanover, Germany, Eastman of Venezuela, and Eastman of Canada and maintains sales-service representatives wherever oil is produced throughout the world. Divisional offices in the United States are located at Houston, Long Beach, and Denver, with regional representatives at all other major oil producing centers.

Parkersburg Expands

A million-dollar expansion of their oil field manufacturing plant at Coffeyville, Kansas, has been announced by The Parkersburg Rig & Reel Co. Recently completed, the expansion includes two new buildings providing an additional 60,000 sq. ft. of manufacturing space, an automotive-type assembly line for final assembly of oil field pumping units, drive-through dock facilities permitting multiple loading of trucks, and enlarged outdoor storage facilities.

"This has doubled our manufacturing area in Coffeyville and has given us a 50% increase in plant capacity," said Fred King, manager of manufacturing of oil field equipment, who made the announcement from Houston headquarters of the organization.

A 50% increase in personnel in their Houston manufacturing plant during 1959 was also announced recently by Parkersburg to step up pre-fabrication of pressure vessels and institute rigid quality controls of manufacturing and shipping.

Smith Named at Climax

E. E. Smith has been named manager, Climax Molybdenum Co. Chemical Division. Previously manager of chemical sales, he joined Climax in 1955 as manager of lubricant development and was responsible for introduction of Molysulfide additive to the chassis grease market. Active in petroleum and chemicals for 10 years, Mr. Smith began his career with Cities Service.

Graham Promoted At JT

B. J. Graham has been promoted to manager of the marketing division of Johnston Testers, Inc. In his new position, he will supervise export and domestic products sales.

Persian Gulf Line Pull

International Marine Constructors, C.A., has successfully completed first pull of a 22-mile 30-inch submarine pipeline in the Persian Gulf, between Khargu and Kharg Islands. The 22-mile submarine pipeline is being laid for the Iranian Oil Exploration and Producing Co. to connect their Gachsaran fields with sea loading facilities under construction on Kharg Island.

Venezuelan Head for Nalco

William H. Rodewald has been appointed vice president and general manager and Kenneth L. Russ sales manager of Nalco de Venezuela, C.A. Nalco de Venezuela has a new plant at Anaco, Venezuela. Administrative and sales headquarters will be located in Caracas.

Stratoflex Bulletin In Spanish

A new bulletin printed in Spanish on Stratoflex hose and fittings for all types of industrial applications is now being offered by Stratoflex, Inc. Available soon will be the same bulletin in French. Bulletins will be sent on request by writing Stratoflex, Inc., P. O. Box 10398, Fort Worth, Texas.

Rollo Promotions

The Rollo Manufacturing Co., Houston, has promoted V. E. Smith to sales manager, P. A. Clower to assistant sales manager, and J. L. Kepple to assistant to the president.

HOW WESTINGHOUSE GAS TURBINES CAN IMPROVE KEY OIL OPERATIONS

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Largest single concentration of gas turbines in the world is the battery of 12 Westinghouse units at Creole Petroleum Corporation's Conservation Plant Tia Juana 2 on Lake Maracaibo, Venezuela, shown above. Their 96,000 horsepower drives centrifugal compressors to help Creole recover substantial quantities of oil through repressurization and also to conserve natural gas. Creole has ordered 14 more Westinghouse gas turbines for other conservation projects.

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OIL COMPANY STAFF CHANGES

R. O. Goodykoontz

J. P. Warner

F. P. Hagaman

W. D. Turner

ROBERT O. GOODYKOONTZ, J. PRINCE WARNER and **FREDERICK P. HAGAMAN** have been elected to the board of Esso Standard Oil Co. Mr. Goodykoontz, general director of marketing, and Mr. Warner, general manager of manufacturing, were elected vice presidents of Esso Standard on August 10. Mr. Hagaman has served as controller of Esso Standard since 1948. General manager of marketing since May of last year, Mr. Goodykoontz served earlier as assistant general manager of marketing and as manager of the company's Virginia Division. He has been with the company since 1930.

LESTER R. MOORE, presently secretary and treasurer of Esso Standard, will become treasurer of the new Delaware corporation, Humble Oil & Refining Co., which was organized on September 4. Others invited to join the new company are **G. B. EDWARDS**, presently controller of the Carter Oil Co., Tulsa, Oklahoma, as head of the Tax Department and **L. J. WEIGLE**, manager of the Southern Division of Carter, to fill the position of secretary. **RICHARD J. GONZALEZ**, presently a director and treasurer of Humble Oil & Refining Co., Texas, will be coordinator of finance and economics of the new company. **NELSON JONES**, presently general counsel of Humble, will be general counsel, and **ORAL L. LUPER**, presently controller of Humble, will be controller of the new company.

W. D. TURNER has been named as manager of head office aviation department of Shell Oil Co. of Canada, Ltd. Mr. Turner succeeds **W. S. LITTLE, Jr.**, who has assumed important duties in the aviation department of Shell International Petroleum in England.

C. E. STARR, Jr., has been named a deputy coordinator of Esso Research and Engineering Co. with responsibility for the consolidation of several supporting services. The first step in this consolidation effort has been the establishment of a new, 300-employee, mechanical division, made up of personnel from four other existing divisions.

With the company since 1936, Mr. Starr rose to assistant director of the affiliated Baton Rouge, La., laboratories and then became public relations manager at Linden in 1951. Two years ago he was appointed manager of technical and public information.

EDWIN W. PAULEY, U. S. oilman, industrialist and former State Department officer has been elected to the board of Western Air Lines, Inc. Mr. Pauley, 56, directs his far-flung oil and business enterprises from headquarters in Los Angeles.

WILLIAM H. PRICE has been elected a vice president of Cities Service Petroleum, Inc., subsidiary of Cities Service Co. Price, in his new capacity will serve as executive assistant to **A. P. FRAME**, senior vice president of the parent company in charge of manufacturing, research and petrochemicals.

W. R. COOPER, the Arabian American Oil Company's general manager for engineering and construction, has been elected a vice president of Aramco and will assume responsibility for all engineering and construction activities of the company. **L. M. SNYDER** has been named vice president in charge of relations, succeeding **R. A. EEDS**, who has resigned to become president of Esso Standard (Libya), Inc., a subsidiary of Standard Oil Co. (New Jersey). Mr. Snyder remains responsible for local sales.

W. R. Cooper

H. C. Sheperd

HOWARD C. SHEPERD, chairman of The First National City Bank of New York, has been elected a member of the board of Sinclair Oil Corp. He succeeds **WM. GAGE BRADY, Jr.**, who has resigned. Mr. Sheperd recently was elected chairman of Fundamental Investors, Diversified Investment Fund and Diversified Growth Stock Fund, effective Nov. 1, when he retires from The First National City Bank. He is also a board member of: The Anaconda Company; Canadian Pacific Railway Company; Corning Glass Works; Federal Insurance Company; New Jersey Zinc Company; Union Pacific Railroad Company; United Aircraft Company; Trustee of the Consolidated Edison Company of New York, and a member of the Board of Trustees of De Pauw University, Greencastle, Indiana.

ROBERT A. EEDS has been named new president of Esso Standard (Libya) Inc., an exploration and producing affiliate of Standard Oil Company (New Jersey). He succeeds **JAMES A. CLARK**, who has retired. **H. W. BROWN**, a director and vice president of Esso Libya, was elected to the newly created position of executive vice president.

Mr. Eeds brings with him to his new assignment a broad background of 26 years of oil industry experience in the United States, the Far East, Venezuela and Saudi Arabia. He began his career with Humble Oil & Refining Company as a roughneck, driller and engineer.

RICHARD J. PLANT to executive vice president of New York State Natural Gas Corp.

MERWIN BRISTOL, from associate general counsel to a director and general counsel, Standard Oil Co. (Ind.). **RICHARD J. FARRELL**, assistant general counsel, to succeed Mr. Bristol.

JOHN P. LUNDE, from chief engineer to assistant general manager, engineering and construction in Arabia, for Aramco.

ROBERT D. WEPPLER, from merchandising supervisor to manager of advertising and sales promotion department of Cities Service Oil Co. (Pa.).

FORREST N. SHUMWAY to secretary, Signal Oil and Gas Co., succeeding **A. E. STEBBINS** and **CHARLES H. PORCH** to new position of manager of marketing divisions.

ZED D. GRISSOM, from exploitation geologist in Tulsa for Sinclair Oil & Gas Co. to manager of district office at Anchorage, Alaska, succeeding **RICHARD L. PORTER. CLARENCE H. UNRUH**, intermediate geologist at Ardmore, Okla. also transferred to Anchorage.

W. W. CLAWSON, from senior vice president and director in charge of exploration, producing, and research, Magnolia Petroleum Co., to manager of exploration for Mobil Oil Co.

HOWARD A. PARKER, Jr. to manager of coordination and supply planning in Standard Oil Co. (Indiana) supply and transportation department.

CHESTER A. BAIRD

Chester A. Baird, former president and general manager of San Jose Oil Co., succumbed to a heart attack on June 20, 1959 while on a fishing trip in Alaska. He was en route from Manila to the United States. Mr. Baird was a graduate of Ohio State University. In 1925 he joined Gulf Oil and worked in Venezuela, Denmark, and from 1948 to 1951 in the New York office of Gulf's foreign production division, which extended his interest to many parts of Latin America, Africa, the Mediterranean area, the Middle East and areas in the Far East. He later retired from Gulf after 22½ years of service. Mr. Baird became associated with San Jose in 1954 and was appointed president in March of 1956.

CASTRO QUESADA

Word has been received of the death last January of Castro Quesada, one of the oldest and most respected members of the staff of Cia. Espanola de Petroleos, Tenerife, Canary Islands. His death is a great loss to his many friends in the company.

ROGER BUTTIN

Word has been received of the shocking death of Roger Buttin, director general of the Ste. des Petroleos d'Afrique Equatoriale Francaise. M. Buttin killed himself with a revolver in his office in Paris on July 23. Nothing in his official or private life can account for his action, however in a letter he stated he had become tired of life and for some time had contemplated ending it. His tragedy is attributed to overwork and fatigue, leading to a severe depression. M. Buttin was the principal French figure in the recent agreements in Algeria with Sinclair and Newmont Mining Corp. He gave an outstanding general lecture on African oil at the recent Fifth World Petroleum Congress in New York. He had spent from 1946 to 1958 in New York, in charge of the office for S. N. MAREP.

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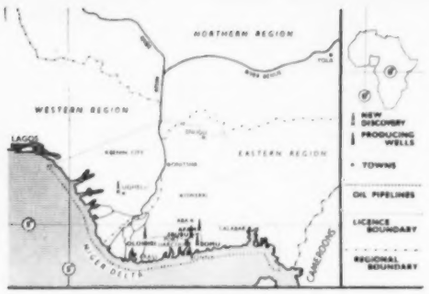
INTERNATIONAL NEWS AND NOTES



Oil Find In Nigeria

Shell-BP Petroleum Development Co. reports the discovery of oil "in appreciable quantities" for the first time in the Western Region in the Delta Province of Nigeria. The strike is at Ughelli, in the sixth well to be sunk in a region where drilling began 5 years ago. The well is separated by some 65 miles of difficult country from Oloibiri, the nearest source of crude discovered by the company so far, and further wells are to be drilled in this new area around Ughelli. The first of these will be at Nun River and about 35 miles northwest of Brass.

Japan Makes Jet Fuel

Daikyo Oil will shortly start production of quality jet fuel under technical cooperation with Houdry Process Corp. Jet fuel sales to the Defense Agency and the Japan Air and U. S. Air Forces are the target of increased competition by oil firms. Daikyo recently decided to build new hydro-desulfurization process equipment. Under Houdry's guidance, the Japanese company is planning to invest more than $1.6 million in new facilities.

Texaco's Trinidad Refinery Expands

Texaco's refinery at Pointe-a-Pierre, Trinidad, is carrying out an $18-million expansion program. New units will increase crude oil capacity to 235,000 b/d from present daily throughput of 135,000. Expansion includes: 100,000 b/d topping unit; 15,000 b/d catalytic reformer; and 20,000 b/d hydrotreater. Also to be added are new tankage, pipelines and utilities. In addition to existing five berths for handling ocean-going tank ships, another will be built to handle new class of Texaco 46,000-ton super-tankers.

Florida Offshore Well

Coastal Caribbean Oils, Inc. has announced that The California Co. has begun drilling operations 1½ miles off the coast of Franklin County in Gulf of Mexico tideland waters on State leases held by a Coastal Caribbean subsidiary, Coastal Petroleum Co. This is the first test of oil producing possibilities offshore from northwestern Florida. It is being drilled by the Standard Oil Co. of California subsidiary under the terms of a 1955 agreement with Coastal for the exploration and development of approximately 4,500,000 acres of State leases on Florida's west coast.

New Mid-East Field

Arabian-American Oil Co. plans to start using oil from the Khursaniyah field in the first quarter of 1960. This will add a sixth producing field. The others are Abqiaq, Damman, Ghawar, Qatif and Safaniya. Three other fields being delinated, the Khurais, Fazzan and the offshore Manifa area, are not in production.

The Khursaniyah field is 105 miles northwest of Dhahran and 60 miles southeast of Safaniya. Oil was discovered in 1956 and there are five producing wells. Aramco is building a gas-oil separation plant for the field. The oil will flow via the Safaniya-Ras Tanura pipeline to Ras Tanura for stabilizing and offshore shipment or processing in the refinery. Aramco considers shipping 45,000 b/d from Khursaniyah and 75,000 from Safaniya through this line. Cost of the new production facilities in the area is estimated at $2,850,000.

More French Discoveries

In the Paris region, Régie Autonome des Pétroles has probably made a new discovery in Montmirail 2. The Dogger was met at 1,831.3 meters, where oil shows were noted, but a first test was dry. More important shows were found below and two more tests, between 1,831.5 meters and 1,851 meters, yielded small quantities of light anhydrous oil. The well is being cored.

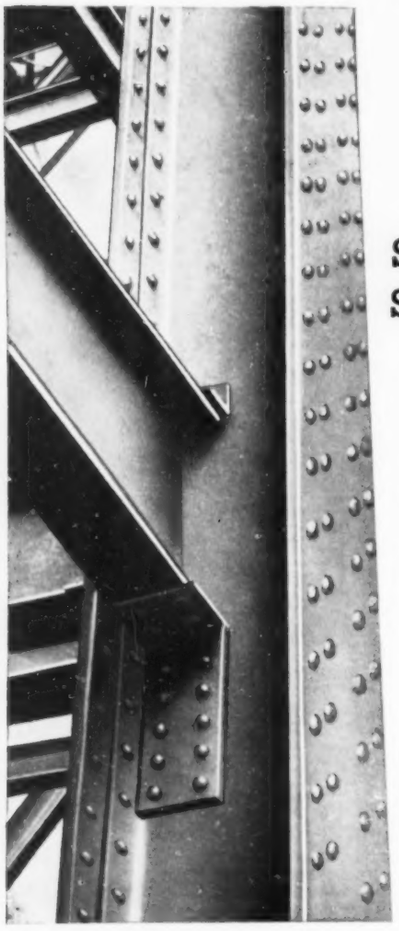
In St-Martin de Bossenay, the Copesep field, S.M.B. 5 was completed as a good producer. Previous production with three wells was 125 cubic meters per day. Not counting this last well, production of the Paris Basin was over 1,200 cubic meters (7,560 b/d) in September, two-thirds from Coulommes, the rest from Chailly-en Biére (C.E.P.), Chartrettes (R.A.P.) and Saint-Martin de Bossenay. Chailly and Chartrettes are the same field, on two different permits.

In southwestern France, in Aquitaine, Charlas 1 of R.A.P. has found a gas bearing formation at 2,143 meters. 2,000 cubic meters per hour were obtained on a two-hours test. This well is only two miles northwest of Saint-Marcet, the wet gas field of R.A.P.

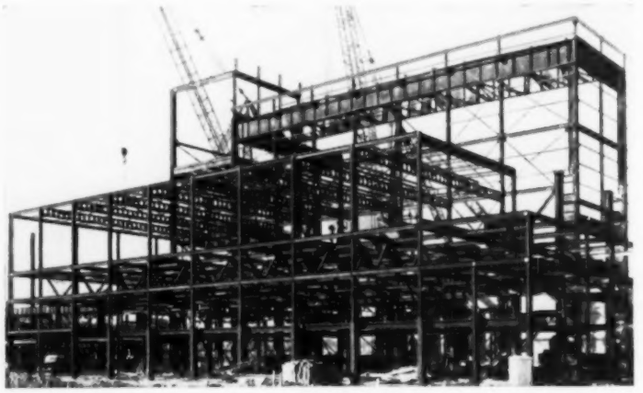
Cagnotte 101, drilled by S.N.P.A. has reportedly hit an oil and gas structure. No details yet available.

In the Sahara, CREPS is deepening a promising well at Ouan Taredjeli. The company is starting exploration of the El Adeb Larach structure with a second well.

In the Senegal, (West Africa), important quantities of gas were discovered in Diam Nade, thirty km from Dakar. 100,000 cubic meters per day of wet gas were obtained on test by Société Africaine des Pétroles (B.R.P. 70%). This the first time that commercial quantities of hydrocarbons are ascertained in West Africa, and the company shows real optimism that an oil field might be there.



STRUCTURAL STEELWORK...



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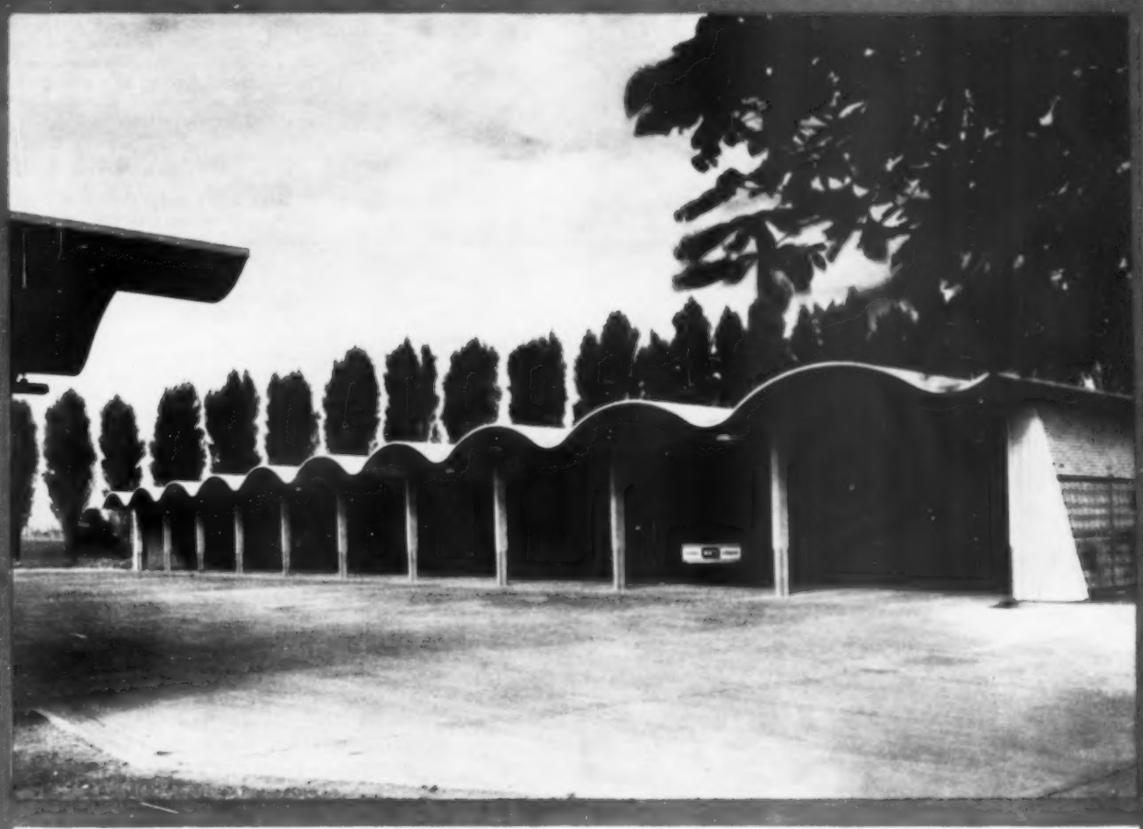

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57

Brazil to Produce 100,000 B/D

Brazil's production, up to 72,192 b/d in July of 1959, will hit 100,000 b/d in 1960, according to Col. Idalio Serdenberg, president of Petrobras. He said a recent wildcat, Curacica, should be a big producer since it encountered about 450 ft of pay. It is in the area of Bahia Reconcavo, site of all Brazil's production so far.

Petrobras search continues with 56 rigs operating during September. Wells spudded areas follows:

Amazon Basin (1): EP-st-1-AZ (Eurunepe), on the Jurua River, 6 miles south of the town of Eurunepe. The location can only be reached by hydroplane or by boat via the Solimoes River. A Cardwell rig for 8,000 ft. is working.

Alagoas-Sergipe Basin (3): NT-1-AL (Noroeste de Taboleiro); PA-st-1-AL (Paripueira); PTA-2-SE (Pacatuba).

Bahia Reconcavo (1): TQ-4-BA (Taquipe).

Parana Basin (2): MR-st-1-RGS (Marcelino Ramos), the first well to be drilled in the State of Rio Grande do Sul; SJ-1-PR (Sao Jeronimo).

Crude oil production in Brazil was 10,355,408 bbl (57,212 b/d) in the first half of 1959. Production of refined products totaled 26,171,166 bbl, including 10,238,160 bbl of fuel oil, 9,035,959 bbl of common gasoline and 3,178,268 bbl of diesel oil.

Argentina's First Half

Crude oil production in Argentina came to 21,412,000 bbl (118,298 b/d) in the first half of 1959. Natural gasoline output was 42,000 bbl.

Crude oil runs to stills in the first half came to 38,767,600 bbl, against capacity of Argentine refineries of 258,700 b/d. Major products turned out included: fuel oil, 18,122,400 bbl; motor fuel 6,875,800 bbl; distillate including diesel 5,797,200 bbl; kerosine and tractor fuel 4,309,400 bbl; lube oils 537,500 bbl; aviation gasoline 207,600 bbl; other products 2,806,000 bbl; and losses 130,000 bbl.

Crude oil imports came to 18,945,000 bbl in the first half, of which 13,572,000 bbl came from Venezuela, 2,609,000 from Kuwait and 1,873,000 from the Soviet Union. Imports of fuel oil were 4,082,000 bbl and of distillate 2,410,000 bbl; kerosine 817,000 bbl; aviation gasoline 264,000 bbl; lubes 149,000 bbl; and motor fuel 93,000 bbl.

Australian Tax Incentives

The Prime Minister of Australia has released details of incentives worth about $3 million to companies engaged in oil exploration in Australia, Papua and New Guinea. He announced an important extension of deductions for exploration to companies that did not explore for petroleum, but which invested capital in oil exploration companies. The legislation would allow deductions for capital amounts contributed after September 30, 1958, without regard to the allotment of shares. Mr. Menzies said that if Australian companies in which non-residents had a controlling interest were to be encouraged to continue the search for oil, taxation allowances would be necessary. It was proposed to widen the law so that those companies be accepted as residents of Australia and qualified for the deductions.

Amoseas Strike In Libya

American Overseas Petroleum Ltd., exploration and producing company of the Caltex Group, has completed its Beda B-1-47 discovery well in Libya. On flow tests through tubing the well produced 3,650 b/d of 36.6 degree API gravity oil. The well is on one of eight concessions in the United Kingdom of Libya held by California Asiatic Oil Co. and Texaco Overseas Petroleum Corp., subsidiaries respectively of Standard Oil Co. of California and Texaco Inc., for whom American Overseas Petroleum Ltd. are managing agents. Drilled to a total depth of 5,107 ft. and plugged back to 4,110 ft., Beda B-1 is in petroleum concession 47. The well is 265 miles south of Benghazi and 132 miles from the Mediterranean coast. The concession covers an area of 1,600 square miles in the southwesterly corner of Petroleum Zone II in the province of Cyrenaica. A location has been selected for Beda B-2 five miles to the north.

Dow to Build In Greece

Dow Chemical Co. will form a wholly-owned subsidiary to manufacture polystyrene plastic in Greece. The Greek government has approved Dow's investment in a plant to cost in excess of one million dollars. Construction will begin as soon as a site has been selected. Operations are expected to start in early 1961. The facility, utilizing imported raw materials, will be the first to produce polystyrene in Greece. The output is scheduled for both the Greek market and for export. The company will be held financially by Dow Chemie A.G., of Basel, Switzerland, a wholly-owned subsidiary which manages Dow investments abroad.

Algerian Oil Well

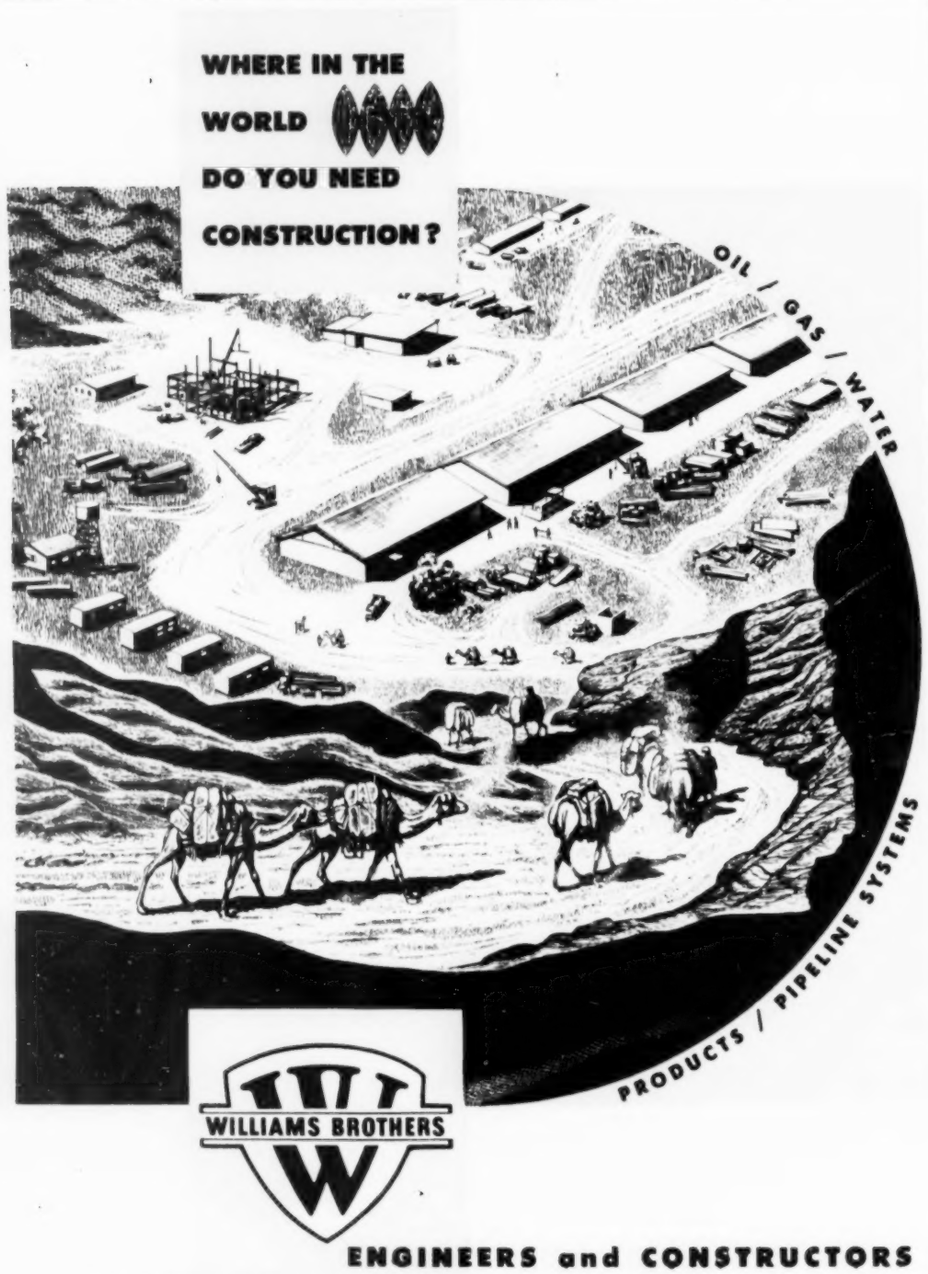
A new structure in the Edjeleh Area (CREPS Eastern Permits) is showing promising preliminary results. It is located some 13 kilometers northeast of Zarzaitine and called Ouan Taredjeli. Drilling started Aug. 9, and reached 1,106 meters on Aug. 31. Reservoir B.2 yielded 600 cubic meters of gas from 640/650 meters. B.4 (696/715) yielded 60 cubic meters/hour gas and 5,000 liters of oil. B.6 (724/735 meters) showed 175 cubic meters/hour gas and 1,000 liters of oil. B.8 (747/762) gave 450 cubic meters of gas with water. At 950 meters, a test at 950 to 970 meters yielded 2,200 liters of oil and 30 cubic meters of gas.

Four more wells on Zarzaitine (38, 39, 40 and 41) and three more on Edjeleh (156, 157 and 181) were completed in August, by CREPS. Other drillings included Ouan Taredert 3—complete.

Three wildcats were abandoned without significant results: Issaouane Nord Est—Gour Tiedou and In Akamil.

Offshore Find In Japan

Teikoku Oil Co. has discovered an offshore oil field off Ohgata-cho, Nakakubiki-gun, Niigata Prefecture, considered the second largest oil field in Japan, following the famous Yabase oil area in Akita Prefecture, 1,000 miles northeast of Tokyo.



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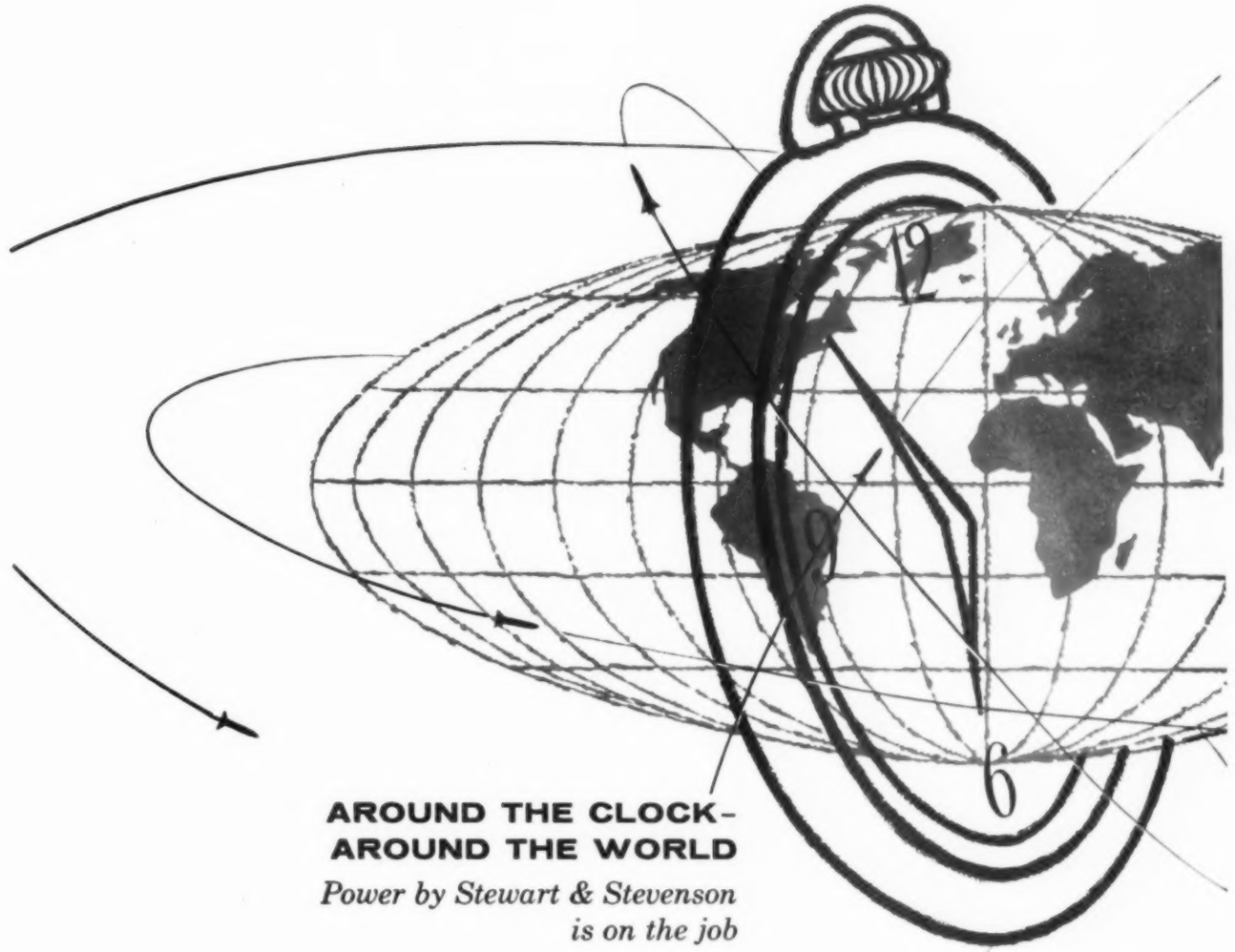

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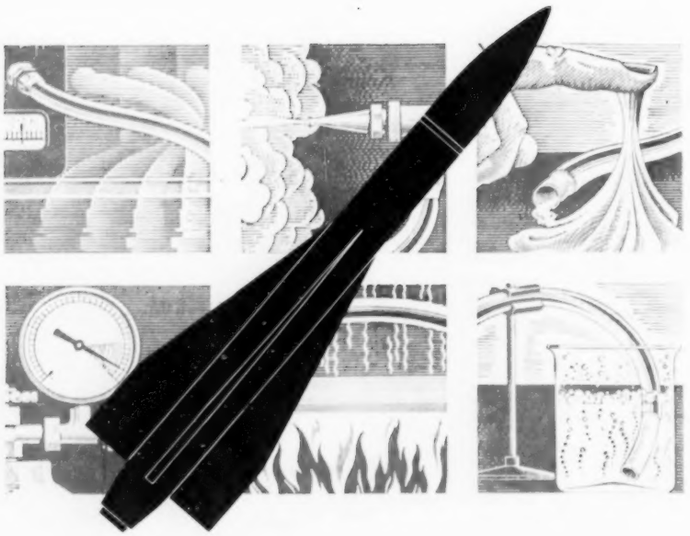

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Oil's Struggle

(*Continued from page 49*)

previous pesos. Royalty, varying so far according to the distance from the coast, shall be standardized at 14.5% in the field and 12.5% in the Llanos, the cost of transport to the coast being for the government's account. Depletion will be reduced to 10% of the gross less royalty, and extension of the single concessions reduced to about half. In summary the new provisions will increase cost of oil development, which is already high in Colombia, considerably.

Ecuador: Ecuador's oil development has been hampered by the low domestic ceiling prices imposed by the government. Crude output declined in 1958 to 3,108,497 bbls or 8,516 b/d. It continued declining in 1959, to only 7,728 b/d in May. Drilling declined to 42 completions in 1958 and only 11 wells were completed in the first 5 months of 1959, of which 9 yielded oil. Footage amounted to 45,474 ft. 1,548 wells were producing at the end of 1958, yielding an average of less than 6 b/d per well.

Construction of a refinery at La Libertad by Anglo Ecuatorian Oilfields Ltd with 7,700 b/d capacity was interrupted and only renewed in July 1959 after raising of ceiling prices.

Tennessee Gas Transmission Co., which acquired the holdings of Manabi Exploration Co., is expected to renew exploration.

California Ecuador Oil Co. is reported to have proposed offshore drilling in the Gulf of Guyaquil, using the drilling barge Rincon used so far by Richfield Oil Corp., offshore in Peru.

The Ecuadorian government raised ceiling price for gasoline in July, to be effective after completion of the Libertad refinery.

Jet Fuel

(*Continued from page 57*)

processing of the high LN fuel, Texaco said. Among these are:

(1) Very low total sulfur content will reduce the corrosion of hot engine parts and increase their life.

(2) Thermal stability and gum test data indicate excellent fuel stability.

(3) Low temperature flow problems are minimized through low freezing point and low viscosity.

(4) Higher heat content per pound of fuel will permit greater payload and/or increased flight range for weight-limited aircraft.

(5) Very low mercaptan sulfur content will help decrease deterioration of elestomers in the fuel system.

(6) The odor of spilled fuel is less pungent and it dissipates more quickly than with conventional fuels, especially aviation kerosine.

(7) Because of very low aromatics content, the high LN fuels hold less water in solution than do aviation kerosine or wide cut fuels. This helps solve the problem of fuel system icing as temperatures drop during flight, and it reduces the load on fuel system heaters.

(8) Ground handling is improved because favorable specific gravity and viscosity characteristics lessen the time required for settling out of free water and particles. END

NATURE'S CATALYSTS (4)

The First Cheese

The origin of cheese-making is lost in antiquity. Legend has it that an Arabian merchant preparing for a long journey poured some milk into his water-bottle, which was made from the dried stomach of a sheep. He travelled through the heat of the day, and in the evening paused to drink. To his amazement, only a thin watery liquid came from the bottle, and within he found a mass of white curd. The enzyme rennin in the sheep's stomach had produced curds and whey from the milk.

The early man-made catalysts were also discovered by chance, but today the theory of catalysis is more fully understood, and the research laboratories of I.C.I. are playing a prominent part both in this field and in the practical development of new and improved catalysts for industrial processes. *Full information on* I.C.I. CATALYSTS *is available on request.*

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B 273

International Drilling Changes

International Drilling Co. N.V., with headquarters at Via Sallustiana 26, Rome, Italy, has announced a number of changes in personnel and offices. Monty R. Garrison, manager, will continue in Rome, along with a small engineering group and other staff. Wallace W. March, managing director and co-owner, has established headquarters at 50 Eastbourne Terrace in London W. 2, England.

O. D. Blankenship, vice president, operations, and his staff have been transferred from Rome to The Hague, Holland. Included in this move are J. Walters, C. L. Bushager and Jess Slater. B. G. Frazier, vice president, engineering, and his staff have been transferred to Tripoli, Libya. Included in this move were drilling engineers G. W. Huff and Mario Severini.

Mr. H. R. Stephens has been transferred from Nigeria where he was serving as manager for IDC to Libya to take over all IDC operations in that country and has been promoted to vice president. O. J. Johnson, formerly drilling superintendent, has been promoted to manager of operations in Nigeria.

W. H. Dowling, formerly general manager of British Petroleum in London, has joined IDC in Rome where Ray Williams continues to reside. J. N. Biron, formerly in charge of IDC's London office, has resigned.

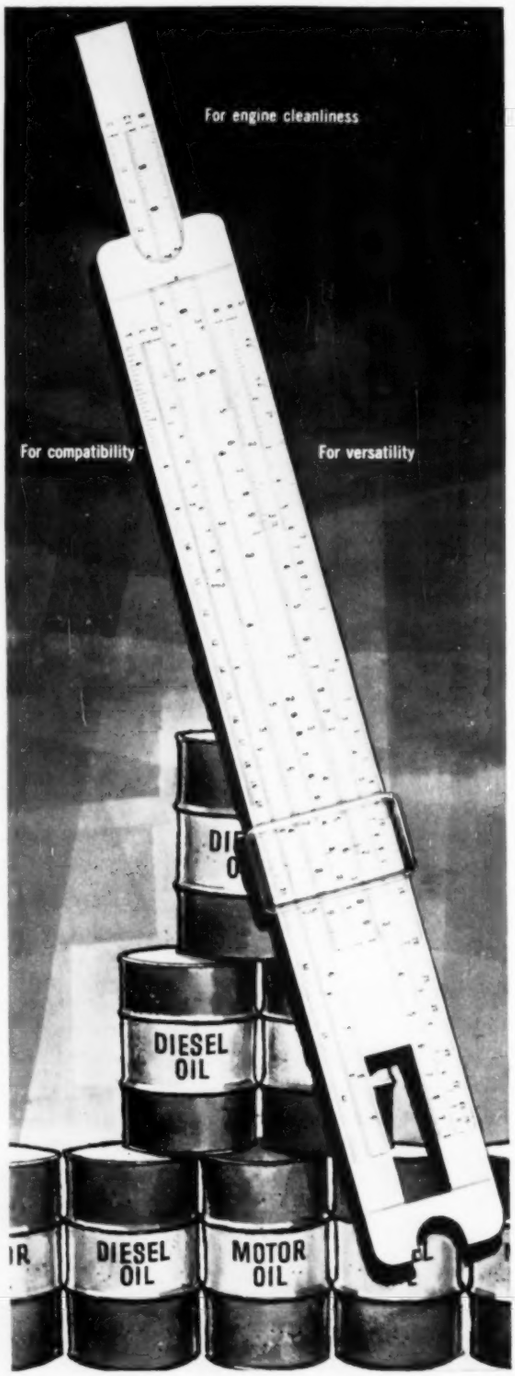
Jersey Standard Net Up 21%

Consolidated earnings results of Standard Oil Co. (New Jersey) for the nine months ended September 30, 1959, were estimated at $477 million. Earnings for the same period a year ago, after adjustment for the increased Venezuelan income taxes retroactive to January 1, 1958, were $395 million. The 21% improvement, it was pointed out by Eugene Holman, chairman, was attained despite competitive pressure on crude and product prices in many areas. Total revenues from sales and investments were estimated at $6,020,000,000 for the first nine months of 1959, as compared with $5,728,000,000 for the same period in 1958. Reaching a new all-time high for a first nine months period, product sales volumes were up about 8% over the comparable 1958 period.

Gross crude oil production including natural gas liquids was estimated at 2,461,000 b/d in the first nine months of 1959, as compared with 2,294,000 b/d for the 1958 period. Refinery runs averaged 2,770,000 b/d compared with 2,430,000 b/d for the first nine months of 1958.

Income and operating taxes, together with import duties, consumer taxes and other payments to the USA and foreign governments amounted to $1,868,000,000 compared with $1,759,000,000 for the same period of last year.

Capital and exploration expenditures by consolidated companies for the first nine months were estimated at $658,000,000, and compare with expenditures of $776,000,000 in the 1958 period. Of the total 1959 outlay, $517,000,000 was for property, plant and equipment, while other expenditures made in the search for oil and gas and charged to current income were $141,000,000.



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AIME Award to Uren

The American Institute of Mining, Metallurgical, and Petroleum Engineers has announced that Leslie Uren, of Berkeley, Calif., Professor Emeritus of Petroleum Engineering, University of California, is to receive the Institute's Mineral Industry Education Award at the AIME annual meeting, to be held in New York February 14-18, 1960.

The citation hails his pioneering work as having "outlined and delineated in detail the present and future areas of petroleum production, engineering and research, particularly through his decimal classification system for the filing of data pertaining to the petroleum and related industries, and the numerous editions of his textbooks on petroleum, exploration, development, exploitation engineering and petroleum economics."

Warren Warns On Taxes

The loss of tax incentives enjoyed by the oil industry would have an "immediate and severe" impact on the industry's $2,500,000,000 a year drilling program, according to J. Ed. Warren, president of Cities Service Co. "The impact on the drilling industry would be as serious as a Federal edict that made it necessary to drill all future wells with fish tail bits," he told a meeting of the American Association of Oilwell Drilling Contractors in Oklahoma City recently. "The adverse effect upon the drilling business brought about by the loss of these tax provisions would without question be immediate and severe," Mr. Warren asserted. "Take away depletion and every exploratory or development prospect will be considerably down-graded in quality because the expected rate of return will suffer accordingly. Take away the right to expense intangible drilling costs and the availability of cash resources for drilling activity will be seriously diminished," he added.

Husky Refinery Expansion

Husky Oil Co. has started work on a major modernization and expansion at Cody, Wyoming, to add new catalytic cracking and alkylation units and increase refinery capacity from 7,000 to 9,000 b/d. The modernization program, which includes construction of a 100-mile finished products pipeline to Billings, Montana, is expected to be completed late in 1960, and will cost approximately $8,000,000.

The Company's crude oil reserves, exclusive of gas reserves, now stand at approximately 39,600,000 barrels. Officers said that this is an all-time high. The Company's consolidated net working capital at June 30, 1959, stood at $10,450,000 and cash and U. S. Government securities amounted to $6,185,000. This was termed the strongest financial position in the Company's history.

Philippine Contract

Century Geophysical Corp. has been awarded a contract for a minimum of one year's seismic operation in the Philippine Islands for San Jose Oil Co., Inc. This seismic crew will be in addition to the four gravity crews that Century has been operating in these Islands for the past two years. Century's division offices are maintained in Manila under the direction of George D. Schedler.

Mohammed ibn Rajih Mohammed, leading engine room operator, checks gauges on one of the two Ruston gas turbines at Nariya pump station which is on the pipeline system that transports oil from Aramco installations to the Tapline terminal at Sidon, Lebanon. Many Ruston gas turbines are now operating on Aramco's pipelines in Saudi Arabia.

Mohammed and his Ruston turbines

To Nariya came two Ruston gas turbines . . . and Mohammed ibn Rajih Mohammed found himself in control of industrial power in its most advanced form. But Mohammed, who is now leading engine room operator at the Arabian American Oil Company's Nariya pump station in Saudi Arabia, soon recognised the simplicity of operating a Ruston gas turbine . . . that's just one of many features of these turbines which have made them so popular with oilmen from the Middle East to the Americas.

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Sun Net Up 42%

Sun Oil Co.'s consolidated net income for the first nine months of 1959 totaled $32,150,590, a 42% gain over the first three quarters of 1958. Gross revenues for the first nine months of 1959 were $567,465,136 compared with $533,154,497 for the same period in 1958.

$200 Million Gas Line

A new company, Transwestern Pipeline Co., filed a registration statement Oct. 20, 1959, the proceeds of which will be used to finance a requirement of $194,498,000 for a pipeline system to supply natural gas to the customers of Pacific Lighting Co.'s subsidiaries in Southern California. It will consist of a 30-inch line from Roswell, New Mexico to the Arizona-California border, a distance of approximately 670 miles. In addition, there will be two 24-inch major lateral lines extending northeast and southeast from Roswell. The initial design delivery capacity of the system will be 300,000 mcf per day and 350,000 mcf per peak day.

Transwestern Pipeline Co. was organized by Warren Petroleum Corp., J. R. Butler and Monterey Oil Co. The natural gas will be purchased by Transwestern in the states of Texas, Oklahoma and New Mexico and its pipeline will connect with facilities of Pacific Lighting Gas Supply Co. at the California border, and thus be made available for the expanding Southern California gas market.

Oil Emergency Plans Set

The National Petroleum Council has adopted a report made by its Committee on National Emergency Oil and Gas Mobilization. The study was prepared pursuant to the request of the Department of Interior that the Council (1) review and comment upon the "Proposed Plan of Interior's Office of Oil and Gas for Handling Petroleum and Gas During a National Emergency"; (2) submit a list of nominees capable of staffing key positions, in an emergency, as full-time government employees in the emergency national and field organizations provided for by the government plan. The study is entitled "National Emergency Oil and Gas Mobilization." Nine key recommendations were set forth by the Committee. Foremost was the recommendation that all oil and gas operations under the Plan be handled by the Department of Interior but so organized that the Secretary of Interior, at cabinet level, would be Administrator of the Plan with authority to report directly to the President of the United States. The mechanical operations of the Plan would be in charge of a competent Deputy Administrator of wide oil and gas experience, reporting directly to the Administrator. The committee has submitted 868 nominations of qualified industry personnel which the government may consider for the executive reserve positions in the emergency organizations under the Plan.

Complete copies of the report, which also includes the individual regional sub-committee reports, may be obtained at the office of the National Petroleum Council, Suite 601, 1625 K St., N.W., Washington 6, D. C.

Alaskan Pipeline Plans

Tentative plans for the construction of a $4 million pipeline and tanker terminal project to move Alaska's first commercial oil production from the Swanson River Unit to tidewater have been disclosed by Standard Oil Co. of California. Socal estimated development wells there would have to reach an assured production of at least 3,000 b/d for five years or more to make the project economically worthwhile. The Swanson River Unit is presently producing about 650 b/d from three wells. Two rigs are currently engaged in drilling additional development wells. The pipeline would be an eight-inch carrier extending 22 miles from the Swanson River Unit to Nikiski, on the Cook Inlet. The terminal facilities there would include a wharf for loading tankers and 240,000 barrels of storage capacity.

Perine Elected At Treco

Thomas M. Lumly, founder of The Refinery Engineering Co. of Tulsa and its president for nearly 18 years, has resigned for reasons of personal health. Woodman (Woody) Perine, vice president of Vitro Corporation of America, Treco's parent firm, will succeed Mr. Lumly as chief executive, according to J. Carlton Ward, Vitro president. Mr. Lumly, a leading figure in the petroleum industry for 30 years, will continue as a member of the Vitro board of directors and as management consultant to Treco.

Davis New Mid-Con Export Manager

John W. Davis has been appointed export manager, Mid-Continent Supply Co. Mr. Davis, who was previously Venezuelan manager for Mid-Continent, will return to New York to direct the activities of the export division from its headquarters there. He had become assistant export manager in New York before his move to Caracas as Venezuelan manager.

Smith Tool Co.

H. C. Smith Oil Tool Co. has received stockholder approval to change the firm name to Smith Tool Co. A new program for diversification is the reason for the name change. Smith Tool, a major producer of drill bits for the oil industry, is presently carrying out plans for design and manufacture of drill bits for the mining industry.

Weir to Make Clark Units

A manufacturing agreement completed between G. & J. Weir Ltd. of Glasgow, Scotland and Clark Bros. Co., Division of Dresser A. G. provides for licensed manufacture by the Weir organization in Glasgow of Clark centrifugal and reciprocating compressors with both motor and gas engine drives. The complete line will be available for purchase in sterling throughout the world through Clark Bros. Co. Division of Dresser (Great Britain) Ltd., 197 Knightsbridge, London S.W. 7. The compressors will be fully interchangeable with those of Clark compressors manufactured in the United States and under license in France and Italy. The units manufactured in Scotland will bear a Weir-Clark nameplate.

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P. L. Myers

Hughes Promotes Four Men

Howard Hughes, president and chairman of the Board of Hughes Tool Co., has announced the appointment of Fred W. Ayers to the newly-created office of vice chairman and the appointment of Maynard E. Montrose as senior vice president and general manager. Mr. Ayers retired from the position which he held for 11 years now to be occupied by Mr. Montrose. Both men have been directors of the company for many years and Mr. Montrose has for 11 years served as vice president in charge of sales, Mr. Hughes said. Promotion of W. H. Siems, general sales manager, to the post of vice president in charge of sales, has been announced by M. E. Montrose, senior vice president and general manager.

Mr. Ayers joined Hughes Tool Co. in 1943. He holds a number of directorships, including one with Trans World Airlines, a Hughes Tool Co. subsidiary.

Mr. Montrose is a director of the Bank of Texas. He is also a director of Trans World Airlines and of another Hughes Tool Co. subsidiary, Hugh B. Williams Co., the latter a manufacturer of mining machinery. Mr. Montrose has been identified with the oil industry throughout his business career. He started as petroleum specialist for General Electric Co. in Dallas and Houston in 1925. He left that company to join Lane-Wells Co. in Tulsa, Okla., serving as vice president and director until 1945 when he resigned to become president and general manager of Marion Power Shovel Co. with whom he remained until joining Hughes. Under his direction Hughes Tool Co.'s sales organization has expanded widely until the company is today represented in virtually every area of the free world where oil drilling is in progress.

Mr. Montrose is a director and past president of the Petroleum Equipment Suppliers Association. He was a director for four years of the American Petroleum Institute and a member of the National Petroleum Council. He is an active member in many petroleum industry associations, including Mid-Continent Oil and Gas Association and the American Association of Oilwell Drilling Contractors. During World War II and the Korean war he served on the government's Industry Advisory Committees for the petroleum, mining and construction industries. He has traveled extensively over both hemispheres on Hughes Tool business.

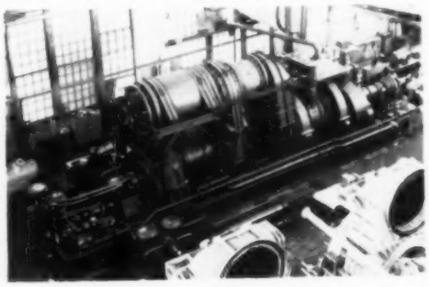
Park L. Myers has been named assistant vice president-sales, Hughes Tool Co. For the past four years Mr. Myers has been domestic sales manager, responsible for the company's sales in the United States and Canada.

Koehring Acquires Larkin Packer

Koehring Co., a leading manufacturer of construction and industrial equipment, has acquired all assets of Larkin Packer Co. Larkin Packer Co., a fifty-year-old concern, manufactures oil field specialties, including such items as a complete line of floating equipment and fittings, such as float shoes, packers, swage nipples, casing nipples, centralizers and a limited line of low and medium pressure heads.

Du Pont Names Purcell

John P. Purcell has been named operations coordinator in the eastern region office of Du Pont's petroleum chemicals division in New York City. He will coordinate services related to the safe and efficient handling of tetraethyl lead and other petroleum additives. Robert B. Bothwell has been transferred to the division's Gulf Coast Region as a sales service representative in the Houston, Tex., area; while Richard R. Golding has moved to division headquarters in Wilmington as a technical assistant to the operations section.



Shown are several 8,500 and 9,300 BHP units on the Clark Bros. Co. assembly floor in Olean, N. Y. Five of these dual-shaft turbines will be used by Shell Co. of Venezuela, for its new gas injection project on Lake Maracaibo. The units will be mounted on a platform over the water and will drive five Clark multi-stage centrifugal compressors. The entire plant, including two other Clark gas turbines and two Clark centrifugal compressors built in Italy by a Dresser A. G. licensee, is designed to handle approximately 190 million cfd of natural gas.

NOTICE

The National Iranian Oil Co., offers for sale during the year 1960, a total quantity of 5,644,000 cubic metres of Iranian Light and Heavy Crude Oils in the following quarterly quantities:

	Light Crude Oil F.O.B. Bandar Mashur	Heavy Crude Oil F.O.B. Kharg Island	
1st quarter	1,375,000	NIL	cubic metres
2nd quarter	1,269,000	125,000	" "
3rd quarter	1,294,000	125,000	" "
4th quarter	1,331,000	125,000	" "
	5,269,000	375,000	" "

MAIN CHARACTERISTICS OF CRUDE OILS OFFERED ARE:

	Light Crude Oil	Heavy Crude Oil
Av. Specific Gravity at 60°F	.8530 (34.39° API)	.8664 (31.8 API)
Sulphur % wt.	1.3-1.4	1.6-1.8
Vapour pressure, lbs. at 100°F	6.5-8.0	8.0-9.0

Particulars as to price, payment, etc., may be obtained from the National Iranian Oil Company, Distribution Division, Tehran, Iran, to whom proposals may also be addressed.

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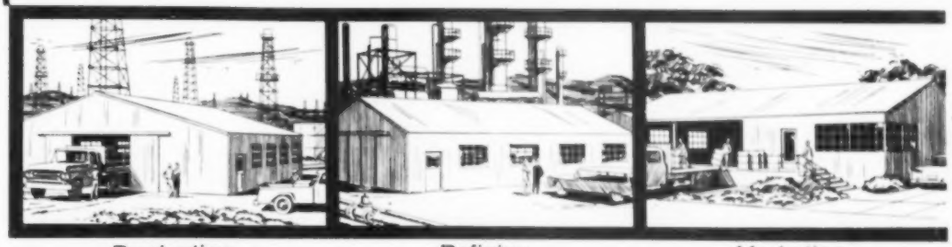

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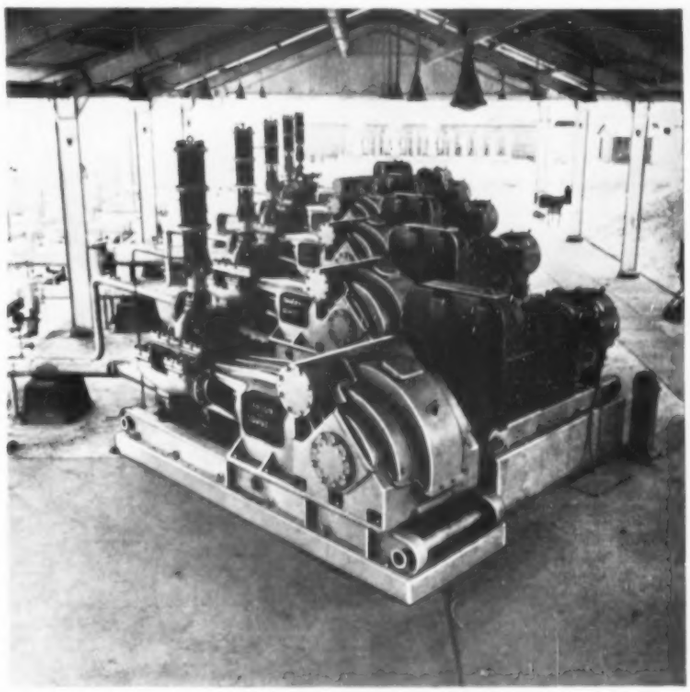

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ADVERTISERS' INDEX

(Advertising Agencies in Italics)

A. E. Ames & Company, Ltd. — 8
MacLaren Advertising Company, Ltd.

Bechel Corporation — 93
The McCarty Company

Bethlehem Steel Co., Supply Division — 21
Gotham-Vladimir Advertising, Inc.

Born Engineering Company — 11
Watts, Payne Advertising, Inc.

British Ermeto — 71
James A. Hodgson Ltd.

British Petroleum Company, Ltd., The — 65
S. H. Benson Ltd.

Cameron Iron Works, Inc. — Cover II
Boone & Cummings

C. E. C. A. — 4
Colman Prentis & Varley S.A.

Chicago Bridge & Iron Company — 25
Russell T. Gray, Inc.

Cities Service Oil Company — 63
Ellington & Company, Inc.

Clark Brothers Company, One of Dresser Industries — 26-27
Persons Advertising, Inc.

M. J. Crose Mfg. Co., Inc. — 96
Paul Locke Advertising, Inc.

Cyanamid International, General Chemicals Dept. — 90
Foreign Advertising & Service Bureau, Inc.

Daimler-Benz A. G. — 69
Heumann Werbegesellschaft MBH

Davison Chemical Division, W. R. Grace & Co. — 7
St. Georges & Keyes, Inc.

Dawson & Downie, Ltd. — 95
James Jack Advertising Ltd.

Dowell, Division of Dow Chemical Co. — Cover IV
Rives, Dyke & Company

Ethyl Corporation — 58-59
Young & Rubicam, Inc.

Gardner-Denver Company — 16
The Buchen Company

Geograph Company — 94
Lowe Runkle Company

Goodyear International Corporation — 17-20
Kudner Agency, Inc.

Gulf Oil Corporation — 6
Ketchum, MacLeod & Grove, Inc.

Halliburton Oil Well Cementing Company — 38
Heintz & Company, Inc.

Haney & Williams Drilling Company — 79
Marian Kress Advertising

Frederic R. Harris, Inc. — 82

Hercules Tool Company — 80
Keefe Advertising Agency

Hewitt-Robins, Inc. — 88
Fuller & Smith & Ross Inc.

Holman Brothers Ltd. — 1
Samson Clark & Company Ltd.

Horseley Bridge & Thomas Piggott Ltd. — 84

I.C.I. Billingham Division — 89
Clifford Martin Ltd.

I.C.I. Heavy Organic Chemicals Division — 78, 80A
Clifford Martin Ltd.

International Paints Ltd. — 9
Mayfair Advertising Ltd.

Johnston Testers, Inc. — 23
Rives, Dyke & Company

Lafarge Aluminous Cement Company, Ltd. — 73
Allardyce Palmer Ltd.

Lummus Company, The — 2, 5
G. M. Basford Company

McCullough Tool Company — 77
Raymond O. Perry, Advertising

Mid-Continent Supply Company — Cover III
Magnussen Advertising Agency

Mission Manufacturing Company — 83
Rives, Dyke & Company

Lee C. Moore Corporation — 56
Paul Locke Advertising, Inc.

National Iranian Oil Company — 94

Outboard Marine International, S.A. — 33
Erwin Wasey, Ruthrauff & Ryan, Inc.

Petrolite Corporation — 35
Batz-Hodgson-Neuwoehner Advertising Agency

Procon Incorporated — 24
Tobias, O'Neil & Gallay, Inc.

Ruston & Hornsby Ltd. — 91
Industrial Publicity Service Ltd.

Santa Fe Drilling Company — 92
Dozier Eastman & Company

Schlumberger Surenco — 55
Rives, Dyke & Company

Security Engineering Div. One of Dresser Industries — 13
The McCarty Company of Texas, Inc.

Shell International Chemical Co., Ltd. — 28-29
Auld & Tilbury Ltd.

Smith Tool Company — 37
Barnes Chase Company

Socony Mobil Oil Company — 15
Compton Advertising, Inc.

Soulé Steel Company — 95
L. C. Cole Company, Inc.

Standard Oil Company (New Jersey) — 67
McCann-Erickson, Inc.

Stewart & Stevenson Services, Inc. — 87
Rives, Dyke & Company

Sun Shipbuilding & Dry Dock Company — 14
Doremus-Eshleman Company

Temperature Limited — 34
J. Peers & Associates Ltd.

Thornycroft Organisation — 32
Gould & Partners Ltd.

Tileman & Company, Ltd. — 85
Scott-Turner & Associates Ltd.

Universal Oil Products Company — 30-31
Tobias, O'Neil & Gallay, Inc.

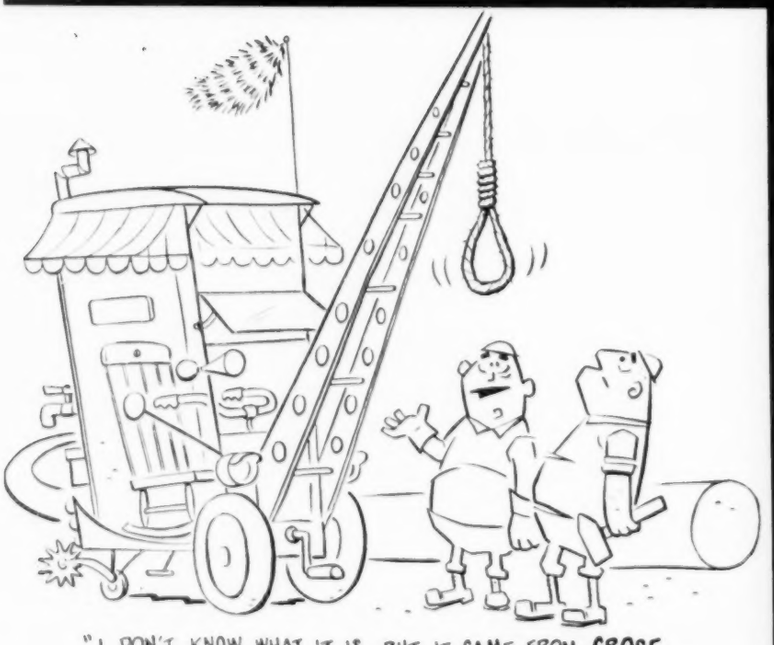
Universal Oil Products Co. Products Dept. — 75
Tobias, O'Neil & Gallay, Inc.

Vospec Limited — 76
Wm. Dawson & Sons Ltd.

Westinghouse Electric International Co. — 81
Gotham-Vladimir Advertising, Inc.

Williams Brothers — 86
Ferguson-Miller Associates

Woodfield Rochester, Ltd. — 36
KS Advertising Ltd.



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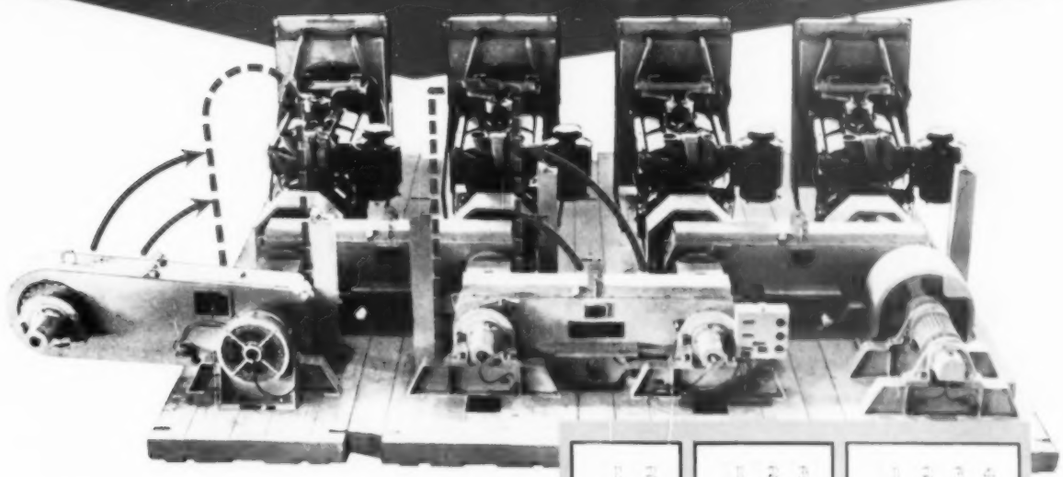

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